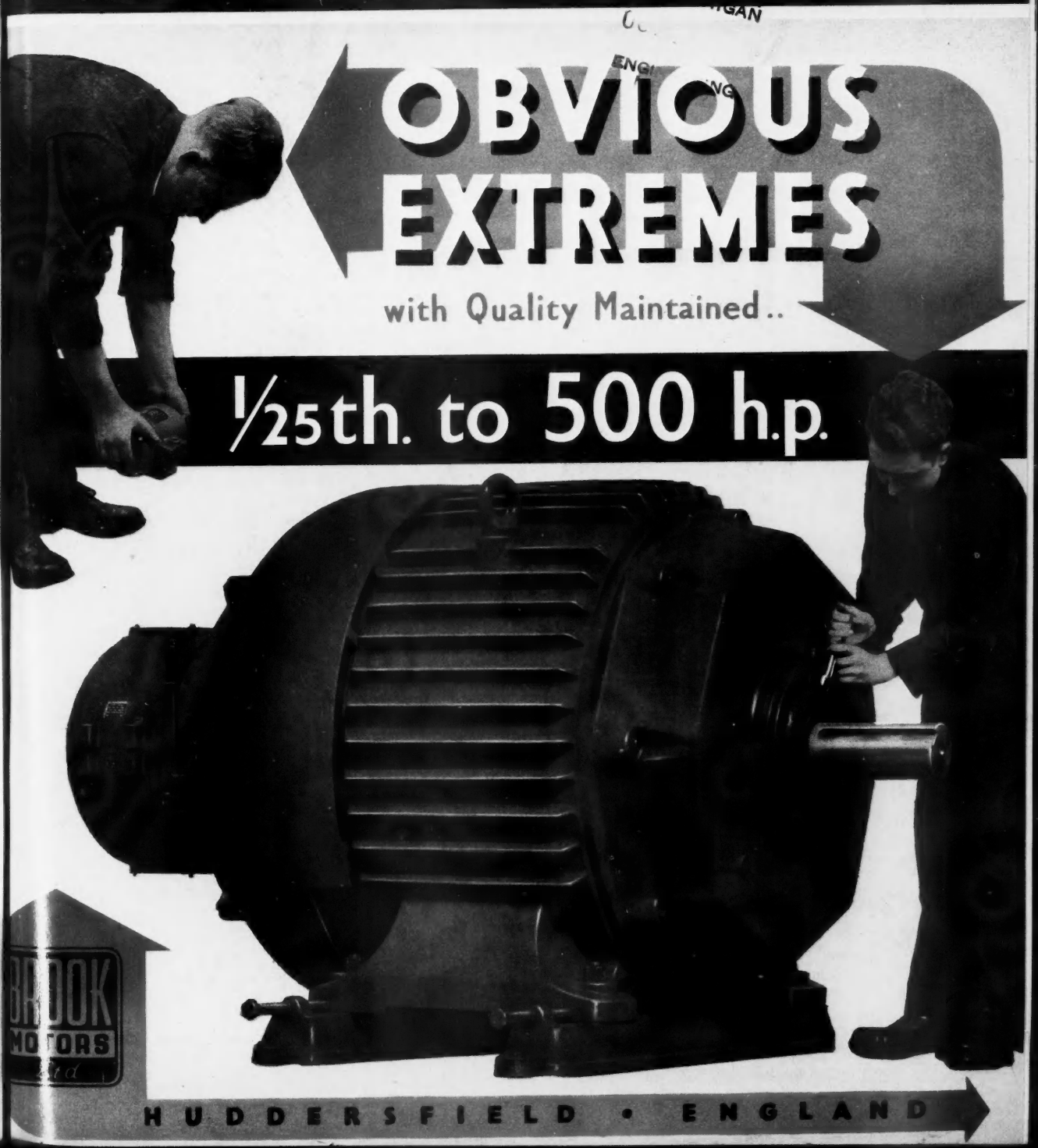
ELECTRICAL REVIEW



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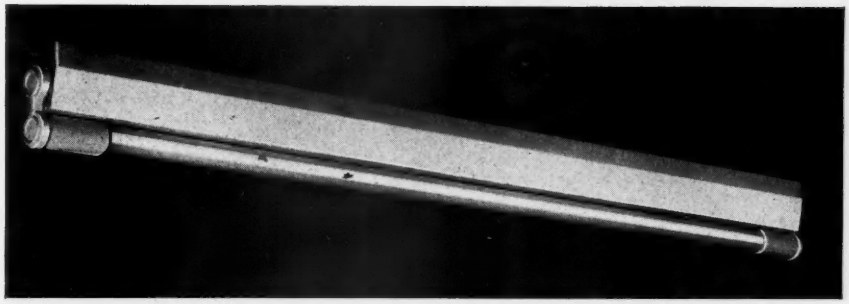

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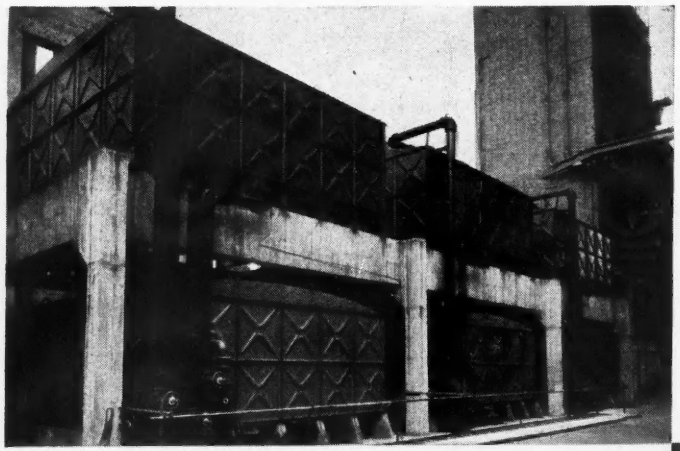

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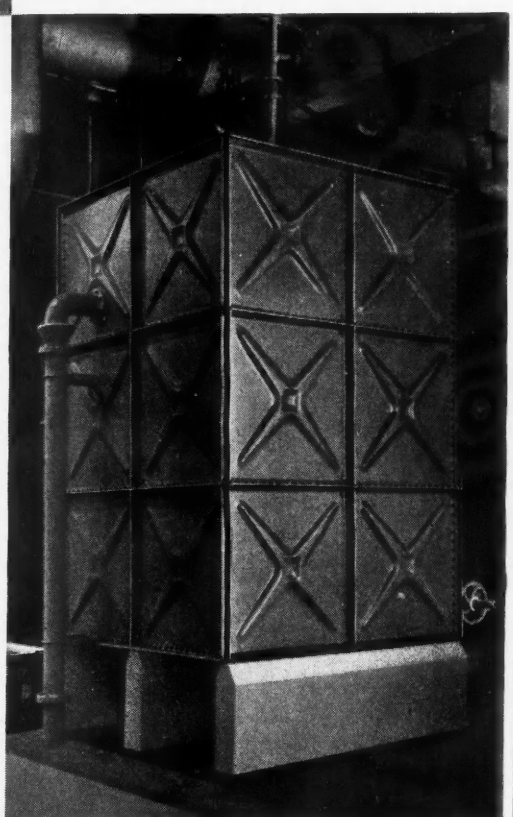

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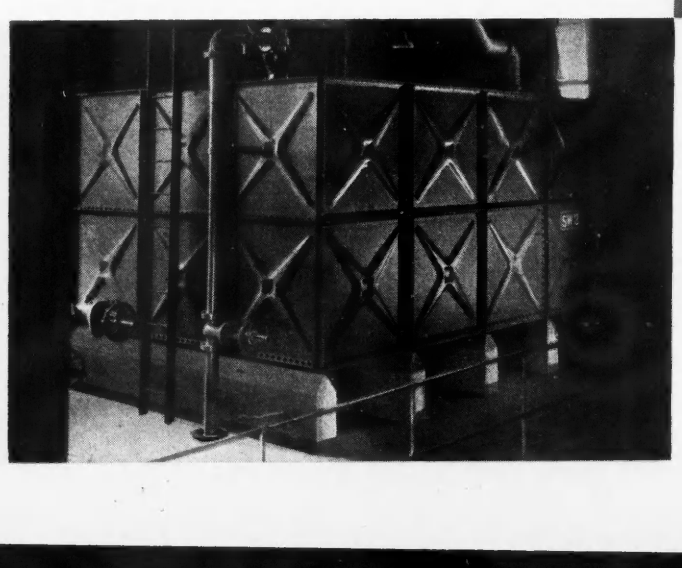

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14 OCTOBER 1955

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ELECTRICAL REVIEW

14 October 1955 Vol. 157 No. 16 Established 1872

Domestic Electrification

TO-DAY when the pressure of internal expenditure is creating inflationary conditions and endeavours are being made to curb it some may consider this to be an inappropriate time for the production of an issue devoted to domestic electrification. We think that this view is a mistaken one in these days when the fullest use of electricity in the home must be regarded as the normal way of life.

Generally speaking, electrical appliances may be placed in three groups: the fully essential; the desirable but less essential; and the " luxury " class. Nobody doubts that lighting, cooking, heating and water heating are essential in the home and we hold that electrical methods are the best. That is why we believe that the restrictions imposed upon the hire-purchase of appliances for these purposes were ill-conceived. The second class is not easily defined: many would hold that electric irons, vacuum cleaners and washing machines, at least, are essential; they certainly are to many people who have limited time for household work or are physically handicapped. Luxury is a relative term and many appliances formerly regarded as falling into this class are now held to be indispensable. In some cases they are, e.g., electric blankets for invalids and elderly people.

The purpose of restricting the purchases of goods by people in this country is to persuade manufacturers to intensify their efforts to sell their products overseas. This special issue will also serve in this direction by acquainting our Commonwealth and foreign readers of the immense scope and variety of domestic equipment made in Great Britain.

Because the production of domestic appliances is an easier business to begin than the manufacture of heavy equipment—generators, motors, switchgear, transformers and cables—it is only to be expected that many possible customers are making their own. All the same British manufacturers have been quite successful in overseas markets. Last year, for instance, they exported electric cooking appliances to the value of £2,227,515, space and water heating equipment valued at £1,688,603, vacuum cleaners £2,031,716, floor polishers £1,165,235, and washing machines and parts £5,160,447. Complete statistics of the proportion of exports to total production are not available. It is known, however, that last year of a total output of over a million electric washing machines, about 24,000 were exported; corresponding figures for vacuum cleaners were 1,220,000 and 290,000; for kettles 585,600 and 63,600; and toasters 268,800 and 99,600.

Overseas readers will also gather from articles specially contributed to this issue that much is being done to ensure that British domestic electrical equipment conforms to accepted standards of design and construction and that it is safe, reliable and durable.

MODERN MIRACLES

Fears of exhausting economically available supplies of energy in the face of increasing world populations, accompanied by a striving after better living conditions, have been set at rest by the progress made in the development of nuclear energy for the generation of electricity. Sir George Nelson in his presidential address to the Institution of Electrical Engineers (reported in this issue) referred to the result of this activity as one of those miracles which occur from time to time, at the appropriate moment, to meet the needs of mankind. Such miracles, however, as was to be inferred from the context of Sir George's address, come from efforts expended in research and development over many years by scientists and engineers and also from the courage of those directing the course of events in using their imagination to prepare for the needs of the future. Settling the pattern of the means for generating a large part of the electricity that will be required in the future should not divert attention from the diminution of natural supplies of basic materials now in common use, upon which the extended use of electricity depends. Sir George made evident his faith in the ability of man to find satisfactory or better substitutes, his main concern being not with whether obstacles can be removed but with how soon they can be removed. The chief cause for anxiety is whether methods of education and training can be devised to fit men in sufficient quantity and, at least as important, of the requisite quality to take advantage of latent possibilities that should appeal to mentally adventurous youth.

THERMO-NUCLEAR POWER

Representatives of the United Kingdom Atomic Energy Authority at the recent "Atoms for Peace" Conference in Geneva were closely questioned about the possibilities of harnessing the energy of nuclear (hydrogen) fusion. Sir John Cockcroft implied that British nuclear physicists were working on the subject and said that he had no doubt that ultimately power would be developed from this inexhaustible source. Last week much more was said about what has been described as "the harnessing of the hydrogen bomb" by Mr. Strauss the chairman of the United States Atomic Energy Commission. He said that this was now a major project in which a number of American research and development establishments were taking part and it involved "quite a significant sum of money." The magnitude of the task was underlined by Professor Spitzer. Saying that deuterium (a heavy isotope of hydrogen) was most suitable for the purpose he showed that it would be necessary to achieve temperatures of the order of 100 million deg F in a gas confined within walls that remained relatively cool; to control the reaction; and extract the heat released for the generation of electricity. Consequently the commercial application of this energy to the production of electricity could not be expected for "a very considerable number of years."

FAIR TRADING

The appearance of a new edition of the Electrical Fair Trading Policy—the sixth—presents an opportunity of drawing attention again to the useful work carried out over the last nineteen years by the Electrical Fair Trading Council. It is also opportune in the light of the suspicion and criticism which any form of trade organization or regularization now suffers. If any industry or trade is to continue to exist and carry out its functions efficiently it must be properly remunerated. This means that there must be a fair and consistent scale of discounts based upon the services which each section of the industry renders, and that these discounts should be reserved to those who earn them and not given to all and sundry. It is of little ultimate advantage to the consumer or the producer if the result of the indiscriminate granting of discounts is the disintegration of the whole trading structure. Some strong views on the slackness which is too frequently encountered, even among advocates of fair trading, are put forward in a letter in this issue by Mr. J. Mortimer Hawkins, a well-known electrical contractor.

DRUBBING FOR DRONES

With commendable courage, Mr. N. Dodds, the M.P. for Erith and Crayford, called attention last week to the appalling waste of time by a gang of London Electricity Board employees working outside his house at Dartford. We think him courageous because he is a Labour member and risks the displeasure of his party and the loss of votes. Everybody knows that full employment is likely to induce a don't-care spirit in a great many men and examples of time-wasting are becoming a part of the industrial scene. Mr. H. J. Randall, the chairman of the London Electricity Board, agrees that "a small minority of L.E.B. employees undoubtedly laze over their work and indulge in restrictive practices" but there is reason to believe that he was understating the position. Nationalized industries are probably more vulnerable to this kind of thing than non-public undertakings but restrictive practices and waste of time are not unknown in the latter. It was time that a protest came from the Labour side. Mr. Dodds may cause trade unions to discourage those members who fail to do what they are paid to do and thus add to the load of the conscientious workers.

OVERSEAS EXHIBITIONS

An article in last week's *Board of Trade Journal* seemed to imply that the Government was unwilling to assist British manufacturers in exhibiting at overseas trade fairs. Agreeing that whenever adequate trade sections were available in such fairs interests of British firms were best served by participating in those sections, the article went on:—

> "Not only has the Government no intention of itself organizing a national pavilion in such a fair, but it will offer no support to any private firm which may attempt to organize one."

It has now been made clear by the Board of Trade that the operative words were "in such a fair." The Government actually does support firms organizing British pavilions where this is the only way in which British firms can arrange exhibits. While in default of anything better a national pavilion is a good thing, results are more likely from a trade section in which exhibits are not lost among a host of irrelevant companions.

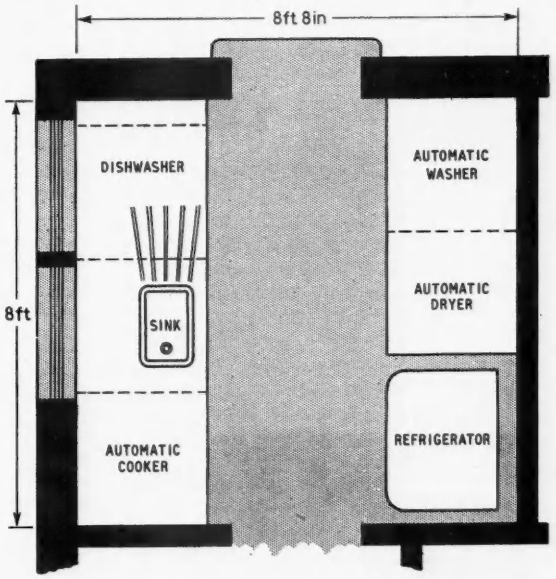
Equipping the Home

Some Factors Which Encourage or Limit Expansion

By H. C. TIMEWELL, M.Inst.R.E., M.Am.I.E.E.*

A WELL equipped house could contain 42 different items of domestic electrical apparatus, excluding various illuminating devices and a power driven workshop. This number is obviously open to dispute because almost every month we are confronted with some new "gadget" or basic piece of equipment to ease our way of life. The American is even better off with electrically driven oil pumps for the heating installation, air conditioners and, what is now perhaps the epitome of laziness, a pistol-shaped electronic device that may be used from an armchair to change a television programme or to "shoot" the offending performer off the screen.

The post-war rise in the demand for various types of domestic appliances is indicative of the relatively rapid social evolution that is accelerating the change in domestic economics. The wider distribution of incomes, coupled with such facts as the virtual disappearance of the domestic servant, have brought about the desire for easier living. Such traditional events as meals at fixed times, Saturday-night baths and Monday wash-days are being superseded by the ability to cook meals quickly at any time (considerably aided by the wide distribution and variety of quick frozen foods) and, with plenty of hot water and mechanical aids, baths and laundry times are suited to the individual's whims or necessities.



Layout of a small American kitchen

Until recent times, statistical information relating to our industry was meagre. The best pre-war estimates indicated that by the year 1939 our factories were producing electric cookers at the rate of 250,000 per annum, washing machines at 50,000, refrigerators at 40,000. The two most widely used electrical appliances were the vacuum cleaner and the hand iron. Since 1946 manufacturers in this country have produced 2,360,000 electric cookers, 8,172,000 vacuum cleaners and 21,140,000 electric irons, while since 1948 2,150,000 refrigerators and 3,860,000 washing machines have been produced and, as nearly as one can approximate, the value of the annual output of home appliances of all descriptions is £150 million.

A sizeable proportion of these appliances is exported, which leads one to the remark that any further and drastic curtailment of home demand must adversely affect our export trade in world markets which have become ferociously competitive.

Despite the imposing size of the figures quoted above, the degree of "saturation," in terms of wired homes, is disappointing in respect of most appliances. The rapid progress of television and its far-reaching cultural and entertainment impact on the British public has probably diverted some of the spending power that otherwise might have been invested in more electrical equipment for the home. In 1954, for example, there were more television sets sold than electric cookers, washing machines and refrigerators combined.

Allowing for the fact that television (after motor cars) comes first in the public's choice, one may pose the question whether manufacturers are in general designing their products—in size, price and functional efficiency — to suit the modern conception of British home life. The answer to this question is almost entirely dominated by monetary economics. This is not to say that the total price of the article, in its particular class, necessarily curbs the demand, and that it is only the low-priced product which the public seek. On the contrary, there are many examples of the marketing success achieved by comparatively high-priced products because they incorporate design features that are both novel and utilitarian, e.g. automatic electric cookers and automatic washing machines.

The root of the problem is in the consumer's capacity to pay; this was ably demonstrated in the recent survey conducted by the Oxford University Institute of Statistics. Given hire-purchase facilities that come within the family's earning and spending power, manufacturers' designers are able to take full advantage of the many diverse ways in which electrical applications may serve the nation. This is very apparent in the United States where easy methods of buying have enabled even the lower income groups to own "automatic" kitchens. While accepting the exigencies of the moment, in the interest of the nation, it will be deplorable if labour-saving home appliances continue to be a form of Treasury "football," suffering from all the inconsistencies of purchase tax changes and other measures which postpone freedom from drudgery.

In the broader sense one can say that manufacturers are fulfilling their duty in designing household equipment to

* Manager, Domestic Appliance & Television Division, English Electric Co., Ltd.

meet the requirements of British households. It would indeed be a retrograde step if the present financial emergency brought about a debasement in design to meet the elusive consumer's pocket.

The marked improvements in design in recent years owe as much to external influences—transatlantic as well as Continental—as to such opinion forming bodies as the Electrical Association for Women, the Testing House Committees of the Electrical Development Association and Electricity Boards, and to the prestige gained by the Council of Industrial Design. The latter's growing authority as a coadjutor and discerner of good design will be further augmented when the forthcoming Design Centre is opened to the public and the trade.

There is, however, one major hurdle with which most manufacturers are confronted. This obstacle to progressive design in the kitchen is the space limitation forced upon us by archaic planners, both architectural and governmental. For some atavistic reason, kitchen designers must site the sink immediately under the window. Having placed the sink and the several doors of the kitchen, the draughtsman is then contented that he has met the specification for a kitchen—ingress door, back door, doors to cupboards and he leaves the placing of essential items like cookers, refrigerators, washers, etc., to the puzzled ingenuity of the retailer and the dismay of the housewife.

A rapid perusal of recent issues of the *Architect and Building News* reveals how hopelessly inadequate and lacking in imagination are the kitchens in our various housing schemes. It is not a question of sheer physical size or floor area. We can plan our kitchens to contain the maximum amount of equipment without increasing the gross cubic contents of the allocated space, or the cost. In front of me is a plan of an "eight foot" American kitchen with a gross floor area of 70 sq ft, which is reproduced. By eschewing planning conventions, the designer has installed within this space an automatic cooker, automatic washer, drying machine, large refrigerator and a dish-washing machine to serve the sink. There is plenty of cupboard storage and ample working space.

It is this ill planning of space in our kitchens that imposes both a restriction on the appliance designer and constitutes a disservice to the ultimate user in being able to provide only a limited range of equipment or equipment which is inadequate to meet a growing family's needs. It also prevents us from thinking in terms of the so called "exploded" kitchen of built-in ovens, cupboard refrigerators and fully automatic devices.

In spite of the present handicap of restraint upon consumer spending and the more lasting effects of inadequately planned kitchens, the future for the domestic electric equipment manufacturer is one of immense potentialities. The keen but healthy competition that exists in the British electrical appliance industry is the surest safeguard against shoddy manufacture and ill-conceived design. This industry has the skill and capacity to make a positive contribution towards the country's aim to double the standard of living in the next twenty years.

Public Knowledge

By P. A. BOOTH

Taking the Mystery Out of Electricity

AT the recent British Association meeting at Bristol Dr. J. Bronowski, the eminent scientist and author, spoke of the need in this scientific age for educating the public to a more technical outlook. "Science," he said, "once the province of the specialist, now enters into the life of everyone . . . we simply cannot dissociate ourselves from the hot water system, and the air visit, and frozen food. A nation unskilled in these, a nation where the screwdriver and the fuse box are still handled with suspicion, is to-day a backward nation."

Although Dr. Bronowski was embracing all modern technology his words have a particular significance for the electrical industry. For there is a big leeway between the variety and ingenuity of the appliances which the public can buy and their electrical awareness. By this I do not wish to imply that we should encourage tampering with installations by amateurs. Indeed, these troublesome persons are a product of electrical ignorance. For while the sales of appliances soar, the public's electrical knowledge remains at a very little higher plane than the switch-pressing level.

When dealing with Americans I have found them more knowledgeable electrically than most British. Both men and women are aware of the significance of appliance loadings and of the interplay of volts and amperes. In contrast the average British adult has a very scant knowledge of such matters. To him, or her, electricity is a mysterious force, docile if all goes well, but liable to do unpredictable and frightening things.

This sort of ignorance has a parallel on the £ s d side of using electricity. As an employee of an Electricity Board I spent much of my time listening to householders complaining that they couldn't *possibly* have used the amount of electricity shown on their account. Until it was explained to them, most had no idea of how their electricity was charged to them or how the loading of their appliances affected their bill. Moreover, a surprising number of executives are equally ignorant of the structure of the commercial tariff or the real running cost of appliances used in their business.

As an instance of this, I know of one departmental store firm which, having rambling premises, carries a large basic block of 4½d units. By rigid economy consumption is kept just below the level of the basic block. As gas is used for much of the heating the business is deprived of the benefit of the 1d rate.

Still more surprising is the lack of electrical knowledge on the part of builders and architects. And these are the very people whose influence is important, both on individuals with new houses and firms with new premises, not to mention potential bulk markets such as local authorities. I have talked with architects who knew little about electric heating, apart from fires, had only a general idea of refrigerator types, and still less of electric water heating.

Both in the domestic and commercial field lack of electrical education is hindering further development of the market. There are still not enough people who think electrically. Like all complex situations it is not easy to

(*Continued at foot of next page*)

The Woman's Part

Educational and Social Activities

By VERA NORVICK*

IT is now over thirty years since the Electrical Association for Women was formed, with Dame (then Miss) Caroline Haslett as its director and secretary. What has it done in that time? What is it doing to-day? To answer these questions we must know why it was started and what prompted it.

A few far-sighted members of the Women's Engineering Society realized the great benefits which electricity could give to the woman in the home, and they knew from their experience in factory and workshop during the first world war, that education of the housewife would be necessary.

The Association was started with two primary objects:—(1) To give the housewife some knowledge of domestic electrical appliances and an insight into the domestic uses of electricity and its wider applications for social, industrial, agricultural, commercial and medical purposes; and (2) to provide a platform for the expression of the woman's point of view on all matters relating to electricity which might affect her private or public interests.

How has this work been carried out? Meetings have been held, with simple lectures and demonstrations, visits, " brains trusts " and discussion groups. These have all played their part in the gradual education which has made thousands of women knowledgeable and informed about the domestic uses of electricity.

As far back as 1927 two outstanding events took place. A meeting was arranged at Queen Elizabeth College—then known as King's College of Household and Social Science—when Mrs. Christine Frederick, an authority on kitchen planning in the United States, gave a lecture on

(*Continued from preceding page*)

say where all the faults lie, or how to put matters right. No doubt the industry itself has done much to confuse the public by the lack of standardization and the multiplicity of types of plugs.

Everybody employed in the industry who is in contact with the public should regard it as his job to simplify the intricacies of electrical application. The basic facts *can* be made comprehensible to the public. Salesmen, in particular, can do much to help the purchaser towards a better understanding of electrical matters. At the least they can explain what it costs to use the appliances they are selling. Electricians—where the cap fits—should cease posing as high priests of a mysterious cult. It is much better to spread confidence in the service which is their livelihood.

The Electricity Boards spend a great deal of money on advertising and exhibitions. But most of them are too preoccupied with selling appliances to play their proper part in spreading electrical knowledge. This is a responsibility which should be shouldered by the supply industry, rather than by the firms who make and sell appliances.

A typical course of practical instruction in the maintenance of domestic electrical equipment using reproductions of E.A.W. charts. This photograph was taken during a special Conference for Housing Managers

" Step-saving in the Kitchen." It may be said that this meeting introduced into this country the subject of " time and motion study " in the kitchen, and it also undoubtedly quickened interest in scientific management in the home.

The other was the first inquiry into the design and performance of the electric cooker, from the housewife's point of view. The E.A.W. then had only a few branches in addition to the London members, but all took part in the inquiry and we like to think that the enamelled hobs and ovens, and solid boiling plates resulted very largely from the report and recommendations sent to all the cooker manufacturers.

Women in the Industry

At that time there were few women demonstrators in the electrical industry; some of them had domestic science qualifications, some cooking experience, and some had neither. Recruitment, status and salaries were all haphazard. But these women were all imbued with an enthusiasm which overcame all obstacles. These pioneers blazed a trail which the E.A.W. developed into a recognized career with professional status.

A Training and Diploma Committee was set up in 1931 with representatives from the electrical industry—the employers; from educational organizations including a representative from the Ministry of Education—the teachers; and the E.A.W. This Committee drew up a syllabus of electrical knowledge and settled the minimum domestic science qualifications which candidates should hold. Now a panel of examiners is appointed by the Committee and the examinations are carried out on public examination lines. While the certificate of examination in electrical housecraft is a theory test, that for the diploma is practical and all applicants must hold the certificate and have had at least four years' experience in the electrical industry. The need for the demonstrator to have a knowledge and understanding of salesmanship has long been recognized by the E.A.W. and the three subjects for the diploma are cookery demonstration, laundry demonstration and salesmanship. The diplomas of those who pass in all three subjects are endorsed: " The holder of this Diploma is a qualified Electrical Housecraft Adviser."

This qualification is recognized by other professional bodies and by local education authorities for part-time teaching of cookery, and while all kinds of cookers must be used in these classes, the advantage of correct instruction

* Miss Norvick is Assistant Secretary of the Electrical Association for Women.

and use when the electric cooker's turn comes is obvious.

In conjunction with the British Electrical Development Association and the Electric Lamp Manufacturers' Association, the E.A.W. arranges an annual conference for electrical housecraft advisers and senior demonstrators and saleswomen, which proves more popular every year. In addition to the practical aspects of the work, lectures by outstanding personalities are included, on the industry's policy, tariffs, and the social implications of electricity, so that these women, many of whom give talks and demonstrations to other women's organizations, may be up-to-date.

After the establishment of the certificate and diploma for demonstrators, the Association was very gratified to receive from members of the teaching profession a request for similar examinations for them. As with the theoretical test for demonstrators, two examinations for the certificate in electrical housecraft are held every year, and they are open to all fully qualified teachers and leading students in training. In some training colleges all the students are expected to take the E.A.W. examinations. Application for the diploma—again a practical test—may be made after two years' experience in teaching domestic electricity, or domestic subjects using electrical appliances.

In addition, summer schools, refresher courses and special conferences have been arranged for many years past, and the regular programme of E.A.W. work now includes two one-day conferences for teachers each year, and these are held in different domestic science training colleges throughout the country.

Sales Assistants and Home Workers

The third professional certificate awarded by the E.A.W. is that for electrical sales assistants. The examination is held once a year, in the spring, and it is open to men and women of not less than 17 years of age who have had at least one year's experience in a showroom or other commercial organization.

One of the most popular courses of instruction is the E.A.W. Home Workers' Course which is taken by housewives, schoolgirls, and even some schoolboys. Its aim is to give everyone a simple and practical knowledge of the use, care and maintenance of domestic electrical appliances, with just enough understanding of volts and watts and the house circuit to enable them to appreciate the "reason why" and to calculate running costs. Syllabuses for shorter courses are prepared when requested and a very popular activity in the last few years has been the three practical classes at E.A.W. Headquarters for anyone wishing to attend. These have been held in the evening to suit business women and it is hoped to repeat them when the Association's new premises are ready.

More and more branches are taking the whole course, with the co-operation and assistance of the Area Boards' staffs and an increasing number of the members are taking the examination which for housewives is a practical and oral test. Some members have even asked for follow-up instruction after obtaining the home workers' certificate with distinction or credit.

This course is also welcomed by an increasing number of schools—secondary modern, grammar and technical—and in the secondary modern school it is popular with the girls in their last year. Even though only a proportion of the schools enter their pupils for the home workers' certificate examination, the number now including some instruction in domestic electricity is considerable and will undoubtedly have far-reaching results.

The methods employed by the Association in order to carry out its second primary object have been mainly a number of campaigns and competitions. The latter include the recent kitchen re-planning competition, and both sections, working kitchen and dining kitchen, proved popular, each attracting a good number of entries.

Following on the first inquiry into the design of electric cookers, the Association conducted a campaign for more electrical outlets to be installed in new houses. Talks were given to members by architects, builders, electrical engineers and contractors and many visits were paid to new housing estates. It was not then universal practice to install even one socket-outlet in the dining room and the living room, and some branches sent deputations to builders and to their local housing authorities.

A further inquiry into the design and performance of all domestic appliances, including accessories, was later held throughout the Association and the report was well received by the electrical industry.

The last piece of work of this kind was the "Towards Perfection" campaign when members of other organizations were also invited to take part. This differed from the previous inquiries in that people were asked for their opinions and suggestions as a result of actual experience in using the relevant piece of apparatus. The report on this inquiry was warmly welcomed by the Press and by the manufacturing industry, and many of the recommendations were incorporated in the new designs. Requests were made for a number of other appliances some of which are now available, but there was an overwhelming demand for a small all-purpose f.h.p. motor to which tools for the many and various household jobs could be attached. Great interest was shown in the question of the protection of the housewife against the purchase of shoddy appliances, accessories and flexibles. Many expressed a wish for facilities to try appliances in service centres before buying, and several branches have reported the introduction of such schemes which are very popular and greatly appreciated.

Preparatory work is now being done for the next special campaign "Planning for Light." This closely links up with the need for more electrical outlets, and members of long standing will remember the interest of the earlier outlet campaign, which included visits to housing estates and discussions with architects and builders. It will be interesting for them to make comparisons with the number of outlets now generally available and accepted as general practice and newer branches will find much stimulation in carrying out similar activities.

Public Service

Undoubtedly the claim that electricity helps to free the housewife for a fuller and wider life is borne out by the number of E.A.W. members who take part in public work. Branches take special interest in old people's welfare, and numerous clubs in various parts of the country have been sponsored by and others are run by E.A.W. branches. Many electrical gifts are presented to old people's homes and to hospitals. Members are found in local government, serving on housing, education and other committees; many are magistrates, and this year no fewer than four have been elected mayors of their respective towns.

The Association is represented in a great many national and women's organizations throughout the country, including the National Smoke Abatement Society, the Institutional Management Association, the United Kingdom Federation for Education in Home Management, Standing Conferences of Women's Organizations, the National Council of Women, as well as by individual membership of Soroptimist and business and professional women's clubs. In all these the electrical idea is present or put forward and mis-statements about domestic appliances, their uses, and cost to run, are refuted by better-informed and enthusiastic users. All this is done in the belief that electricity is the best servant available to women.

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Domestic Electricity

A SURVEY OF MODERN APPLIANCES

PROBABLY no other agency can bring about such a marked advance in the standard of living as the present-day range of electrical appliances, providing as they do not only a means of saving time and labour and encouraging healthier and more hygienic conditions, but also increasing comfort and relaxation in the home.

Since our last survey of electrical domestic appliances there has been no appreciable lowering in the rates of purchase tax although the recent increases in the price of coal tend to emphasize one of the recommendations of the Beaver Committee on Air Pollution that to encourage the displacement of coal in the home, purchase tax should be removed from gas and electric room and water heaters. As a point of interest, electrical goods which still bear the burden of tax include water heaters, washing machines, vacuum cleaners and polishers, refrigerators and space heaters, whereas, broadly speaking, cooking appliances are free of tax.

In the following article we endeavour to give a picture of the services which electricity can perform in the home, at the same time indicating the latest developments and popular demands. As our regular readers will be aware, additional information regarding the more widely used domestic appliances is published at three-weekly intervals in the *Electrical Review* in the form of illustrated surveys, the data being given in tabular form. Next week we shall be dealing with low temperature space heaters, to be followed by thermal storage water heaters, immersion heaters, washing machines, wash boilers, irons, kettles, vacuum cleaners, etc.

COOKING

THE foremost requirement in the all-electric home is the electric cooker and to-day there are over fifty cookers, produced by a dozen manufacturers, from which to choose. No longer is the cooker little more than a " heated box on four legs "; it is now a most efficient appliance with a much-improved appearance. Automatic operation is now commonplace with many makes and this serves to add to their efficiency, low running cost and cleanliness.

The normal " family " type of cooker now has a thermostatically controlled oven and " Simmerstat " or multi-heat control of at least one boiling plate as more or less standard and the de-luxe cookers incorporate such refinements as timing clocks, ringers, strip lighting, etc. It is for instance possible to prepare a dinner in the morning, adjust the automatic timer and leave the house knowing that the elements will be switched on at a pre-determined time and then switched off automatically, resulting in a properly cooked dinner, hot and ready, for the evening return.

The new Falco " Royal " has all these qualities and is also claimed to have the biggest oven and grill ever put together into a single domestic cooker. A striplight is concealed at the top of the hotplate, which also houses the four " Simmerstat " control switches for the three radiant hotplates and grill. Also mounted on the backplate are an automatic timer and oven control switch; all controls are at eye-level.

The tendency towards eye-level cooking is maintained in the new English Electric fully automatic high-level cooker. This is the first model that has departed from the conventional design of cookers inasmuch as the oven has been raised above the hotplate, thus dispensing with the need for bending or stooping while carrying out cooking operations. All control dials are within easy reach, those for the oven and

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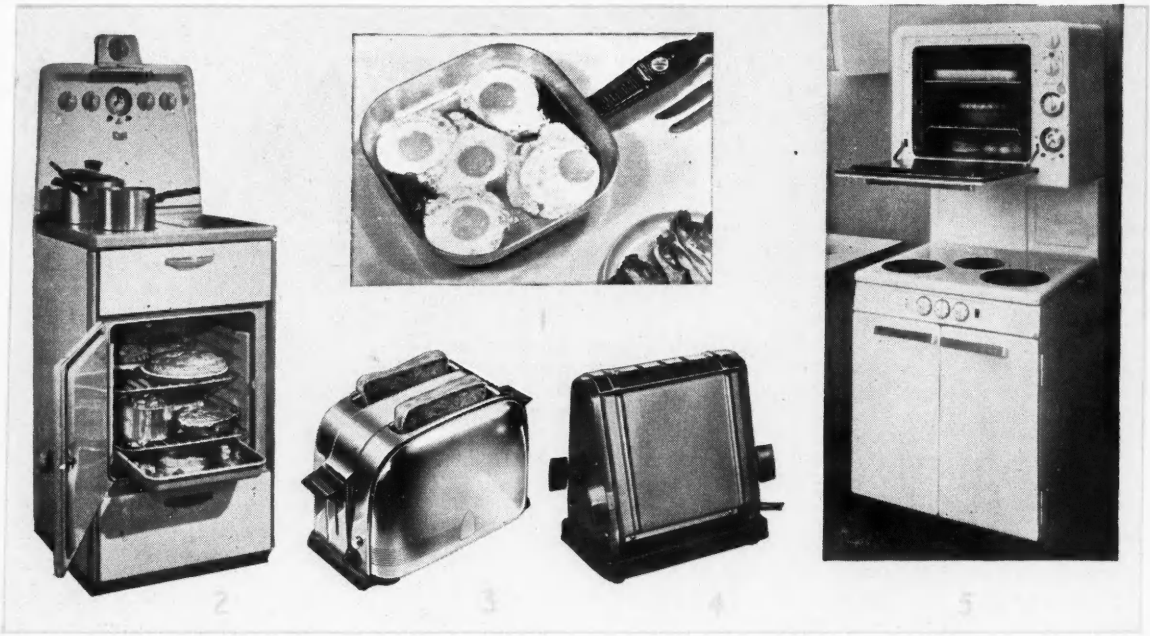


1. Sunbeam automatic frying pan. 2. Simplex "Creda Carefree" cooker. 3. Morphy-Richards "TA/IB" automatic toaster. 4. Bulpitt "950" toaster. 5. English Electric 2020 raised oven model

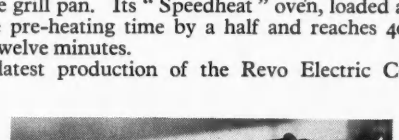
grill on the right-hand panel of the oven and those for the hotplates and hotcupboard along the front of the hob. Other features include a dual-purpose grill which pre-heats the oven, which is claimed to raise the temperature to 400 deg F within eight minutes. A drop-down door forms a shelf for basting or serving. The hob has three radiant hotplates, all "Simmerstat" controlled, and the roomy hotcupboard, like the oven, may be switched on and off automatically at pre-selected times. An exceptionally large storage cabinet, where one would normally expect to find the oven, provides storage space for pots and pans. Despite all the extras it requires only slightly more space in the kitchen than most cookers, the base measurements being 22½in wide by 25in deep.

A new timer control unit, and the new G.E.C. cookers supplied complete with the auto-timer control unit fitted and wired ready for use, provide for fully automatic cooking considerably cheaper than hitherto. The unit incorporates an electrically operated oven timer control, a spring wound "minute" timer and a strip lamp for illumination. Existing G.E.C. DC114 cookers can be adapted to auto-cooking by means of this unit which can be bought separately for £12, and fitted in place of the cooker's splash back.

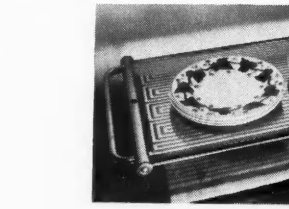
Although electric cooking requires the minimum of supervision, some inspection may be necessary at times and the provision of glass oven doors has many advantages. This feature has been incorporated in some of the Belling models, including the "Wee Baby Belling," for several years. A glass door is also now available for the English Electric standard auto-cooker and for a newcomer to the Simplex Creda range, the "Carefree." This cooker has been designed and priced to bring time-controlled cooking to the widest possible circle. A high splashplate raises the controls to a convenient height and all switch knobs are of the self-indicating type. A pilot light for the oven thermostat illuminates the dial markings and the timer clock face is also illuminated. Up to eight hours of cooking are provided for, to take place at any pre-set times within twenty hours. For greater convenience the ringer supplied with the "Carefree" can be lifted from its position and carried about the house. Solid or radiant boiling plates are available and the plate-warming drawer is easily removable for cleaning. The cooker is finished in either cream or white synthetic enamel.

British National Electrics, Ltd., announced last month a reduction in the price of their C.90 cooker from £50 18s to £48. This attractive cooker incorporates a drop-down door, a heated storage drawer and a "Pyrex" heat-resisting glass casserole grill pan. Its "Speedheat" oven, loaded at 2½ kW, cuts the pre-heating time by a half and reaches 400 deg F within twelve minutes.

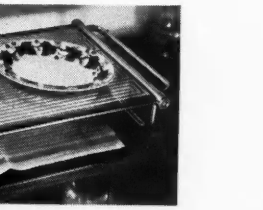
The latest production of the Revo Electric Co. is the



English Electric platewarmer



Left: British National Electrics C.90 cooker



Davidson "Adele" kettle

"Regent" cooker, designed to give the cooking capacity of an extra large model in a small space. It has a full-width oven (to take a 24 lb bird) and its waist-high switches are easy to read and operate. "Revostat" oven control with pilot light ensures correct cooking temperatures. There is a choice of two models, 553 (two boiling plates and grillboiler) and 552 (one boiling plate and grillboiler). As an alternative to leg models it can be supplied with a plinth. Finishes are white with black hob or all cream enamel.

For those who require a really large cooker, incorporating two ovens, each illuminated and with exclusive "Synchrochime" oven heat control, a large warming drawer with lighted signal, separate utility drawer, automatic operation and five radiant hotplates, among other features, there is the Moffat "Style-a-matic" 3225, priced at over £150.

For the flat dweller and those who live in bed-sitting rooms electric cooking has particular advantages. The L. G. Hawkins "Ovenette" embodies annular channel heating with a loading of only 700 W and can thus be operated from a lighting circuit. It can be used for roasting, baking, grilling and even fruit bottling: it is large enough to take two 4 lb chickens. Portable type cookers are also available from C. Hounslow & Co. ("Chalex") and Dexray Engineering Co.

In view of the considerable use of radiant type hotplates Hague & McKenzie stress the importance of their "Pyramid" black ground base utensils. It is well known that black absorbs heat much faster than bright finishes and with their use the demand for quicker boiling times and lower electricity bills is met. All saucepans now have heat resisting "Bakelite" covered handles and are steel reinforced.

When bread is toasted under a grill constant attention is required if burning is to be avoided. A popular line of Bulpitt & Sons is their "950" two-slice turnover toaster which greatly simplifies supervision and for those who wish to be relieved of all responsibility there are the fully automatic types. These can be adjusted to any degree of brownness and switch themselves off automatically. Little new

1. *Moffats 3225 electric cooker.* **2.** *Appliances and Machinery "Contact" toaster.* **3.** *Belling 47AB electric cooker.* **4.** *G.E.C. DC114 cooker fitted with auto-timer.* **5.** *S.L.R. "Brownie" waffle maker.* **6.** *M.E.A.C. "Mastergrill" infra-red contact griller.* **7.** *Falco "Royal" cooker.* **8.** *Tricity "Queen" cooker.* **9.** *Russell Hobbs vapour controlled kettle.* **10.** *Premier "Pylon" kettle.* **11.** *Revo "Regent" cooker.* **12.** *Best Products "Fanfare" kettle*

has been introduced in this line but such toasters as those of Morphy Richards, Pifco, Falk, Stadelmann and G.E.C. retain their popularity.

Much of the hard work entailed in the preparation of food in the kitchen can be eliminated by a food mixer; in addition the scope of dishes and beverages can be extended. One of these is the Sunbeam "Mixmaster" introduced into this country from the United States. The manufacturers, Sunbeam Electric, propose to introduce two new domestic appliances every twelve months, and the latest of these announced a few weeks ago was an automatic frying pan. Square in shape it incorporates a "Fry-Guide" in the handle and by setting this control to the appropriate marking on the dial it is possible to prepare most fried dishes and leave them unattended until they are ready to serve. Insulated feet allow it to be used on the dining table if desired and it is large enough to fry five eggs at one time.

Returning to mixers, Kenwood Electrics announce the "Kenmix 55" liquidizer at a new low price. This has a speed range of 14,000 r.p.m. and the goblet can be completely dismounted, an advantage when dealing with baby and invalid foods. The same company's "Roto-Blend" is a unit which can extract the juice from vegetables and fruit and is especially useful to those people on a special diet.

The "Paladin" food mixers, distributed by Barclay & Sons, are available in three models. The "Junior" has a pulverizing goblet, capable of creaming small quantities of fat and sugar. The "Senior," a more powerful model with four speeds, as against two on the "Junior," has a gear attachment available enabling it to be used in conjunction with a cake mixing bowl. The "Twin" incorporates a 6 pt cake mixing bowl with the liquidizer and will do almost everything in the preparation of foodstuffs. All driving parts and gears are encased.

One 5 pt and one 2½ pt oven-proof bowls are supplied with the English Electric mixer and mixing, beating, whipping, or blending light or heavy ingredients is easily accomplished by selecting any one of twenty speeds on the dial conveniently set on the side of the mixer and switching. Optional attachments include a mincer and a juice extractor, and a plastic cover is supplied to keep the mixer dust-free.

The "Bamix" mixer has just been placed on the market by Haynor, Ltd., and supplies are now becoming available. This portable mixer is supplied with a small detachable mixing bowl making it suitable for grinding coffee beans; other attachments enable it to be used as a drink mixer and egg whisk.

After preparation of food for the table it is essential to keep it warm and this is where plate warmers and heated food trolleys are invaluable. The English Electric plate warmer not only graces the sideboard but its gentle heat keeps plates and dishes at the right serving temperature. The hotplate itself consists of two specially designed heat-resisting glass panels between which the heating element is sandwiched. The frame is of chromium plated solid brass or copper and it is readily cleaned with a damp cloth.

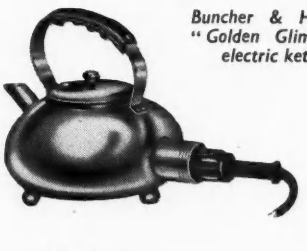
One feature of a new G.E.C. electric warming plate for keeping cooked dishes hot is a heat-resisting, non-scratch, glass top which is held in position by two studs. The rolled sides of the warming plate are finished in chromium plate and the end brackets and feet are of heat resisting black Bakelite. The heater surface measures 18in by 10in.

The Premier Electric Heaters plate warmer will also save extra journeys to the kitchen for the second course. It is available in two sizes, 20in by 10in and 30in by 10in, both of which are chromium plated. The respective loadings are 240 and 360 W.

Besides being an attractive piece of furniture for the dining

Left: Hotpoint "614P1" percolator. Right: Cona de-luxe table model coffee percolator

Buncher & Haseler "Golden Glimmer" electric kettle



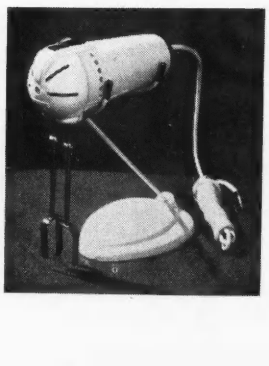
Left: Kenwood "Roto-Blend" fruit juice extractor

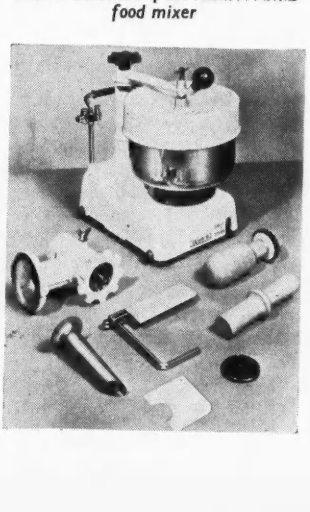
"Stardust" coffee service (Elga Products)

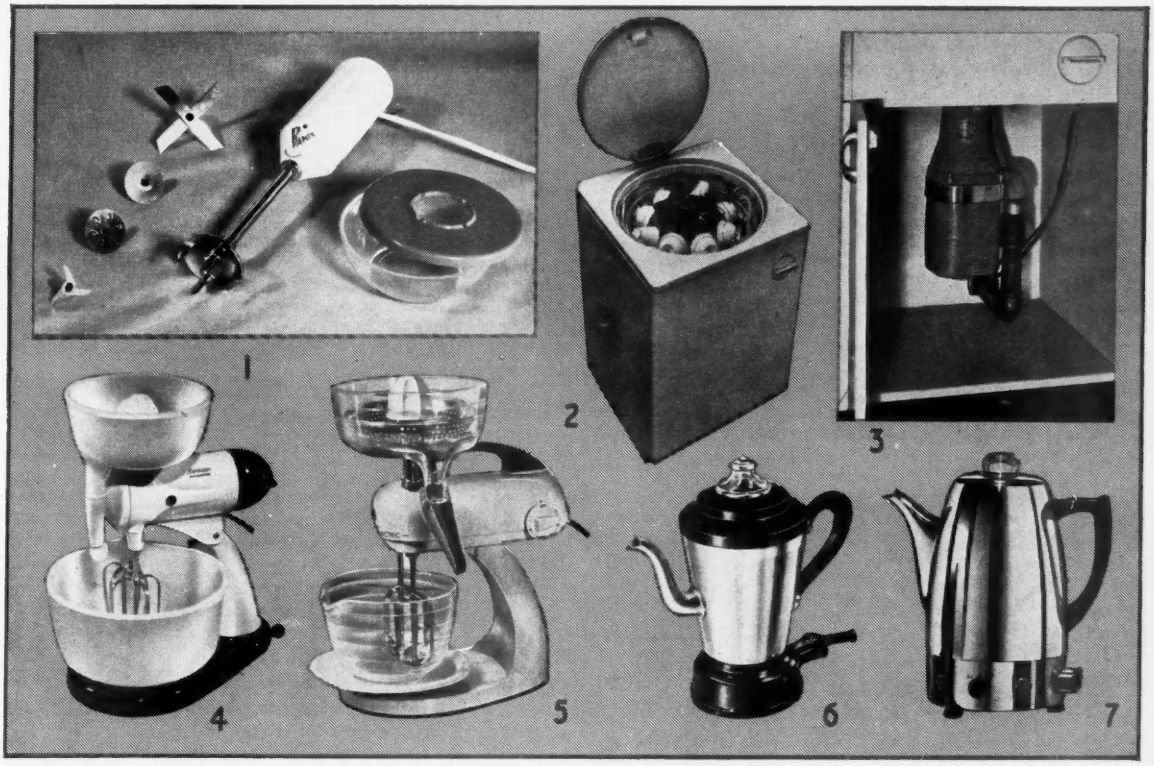
Below: Basic set of the H.M.V. F.M.2 food mixer

Barclay & Sons "Paladin Twin" food mixer

Below: "Valmix" portable food mixer (Valmade, Ltd.)







1. "Bamix" mixer with accessories. 2. "Dishmaster" dish washing machine. 3. "Wastemaster" kitchen waste disposal unit (Dishmaster). 4. Sunbeam Electric "Mixmaster" food mixer. 5. English Electric "5500" mixer. 6. Cass Electronics "651" coffee percolator. 7. Best Products "No. 2" percolator

room the Bertram Thomas electric buffet ensures food being kept hot for long periods without loss of quality. The models have hotplates both on the top of the trolley and inside the enclosed compartment. Extra sockets on the buffet provide for the plugging-in of kettles, toasters, etc. Although primarily intended for hospital use, the "Stellex" range of food conveyors is also made to customers' dimensions and smaller models for the home are quite popular. One of the latest types is designed for use on slopes and incorporates such features as a hydraulic damper to prevent oscillations, counterbalance weight to prevent unevenness of loading and spring ball-bearing castors. Any of the standard size conveyors can be supplied as suspended models.

For speed and efficiency the electric kettle probably has no equal and there are innumerable examples. Bulpitt & Sons list over twenty models including a whistling kettle and a combined kettle and saucepan. Three- and four-pint capacity kettles are the most popular although two-pint models are also increasingly demanded if only because their low loading allows them to be used on the lighting circuit.

Buncher & Haseler, Ltd., manufacturers of a large range of ground-base utensils for electric hotplates, have introduced the "Golden Glimmer" kettle. It has a capacity of 4 pt and is fitted with a 1½ kW element. Coloured to a golden shade on anodized aluminium, hence the name, is has a black plastic handle and matching lid.

Instead of the shrill note of the ordinary whistling kettle, the Best Products "Fanfare," as its name implies, gives warning by a loud, pleasant, organ-toned chord. The company's "Family" kettle is a fast heating type and has a special safety engagement which prevents the lid falling off when pouring and positions the vents to deflect scalding steam away from the hand. Although this particular kettle is usually in 2, 3 and 4 pt sizes only the 3 pt size is available at present.

A special feature of the Russell Hobbs vapour controlled automatic kettle is that it switches itself off when the water boils thus preventing a common occurrence—the steam-filled kitchen. To bring the water back to the boil the indicator switch in the handle, which pops out when the kettle switches off, is depressed. The element contains an additional protective switch to guard against damage should the kettle be switched on when dry.

The luxury of tea in bed in the mornings without the necessity of getting up to prepare it is one of the benefits of the automatic tea and coffee making sets. Although no newcomers have entered the market during the past twelve months, the sales continue satisfactory. Several makes include both an alarm clock and bedside lamp and they are also becoming increasingly popular for use during television sessions.

An appliance which is as pleasing to the eye as it is capable of making good coffee is the electric coffee percolator. Typical of these is the Hotpoint model which is designed on classical lines and finished in chromium plate. It has a capacity of eight coffee cups and is designed to pour without spoiling the table linen, besides being entirely automatic, keeping the coffee hot until required, and cutting itself off when dry. Best Products "No. 2" percolator provides for "flavour control" and indicates by means of red and green pilot lights when it is percolating and when just "keeping hot."

Apart from a few urn type models most percolators are of the conventional coffee pot shapes and are finished in chromium on copper, although a few of the cheaper ones are of aluminium. Russell Hobbs however favour the ceramic pot which helps to retain the full coffee flavour and they give a choice of three contemporary flower designs, "Crocus," "Spring" and "Ming" in addition to pastel shades of primrose, dove grey and green. Elga Products, who also manufacture pottery models, have recently announced their "Stardust" coffee service. This Staffordshire coffee set is of contemporary design and makes coffee automatically, keeps hot indefinitely and cannot stew or boil dry. A pilot light shows when the coffee is ready and percolation time is adjusted according to the quantity of water used. The

capacity is 1½ pt and the percolator is available in three colours, black, red or green, offset by black base and contours.

Bacon grilled in 15 seconds, fish in 30 seconds and steak in 2 minutes sounds like an anticipation of the future but this is the claim of M.E.A.C., Ltd., makers of the "Mastergrill" infra-red contact electric griller. In this the food is in actual contact with both top and bottom heating plates, both sides being cooked at once. Temperature of the plates is thermostatically controlled and the total loading is 1,200 W. A neon indicator lamp shows when the grill is switched on.

When unexpected visitors arrive and there are no biscuits or cakes in the larder, possession of a waffle iron can sometimes save the day. The new waffle iron marketed by Dualit, Ltd., has a patent overflow rim and five heart shaped waffles can be made at one time. The loading is 800 W and chromium plated covers are provided.

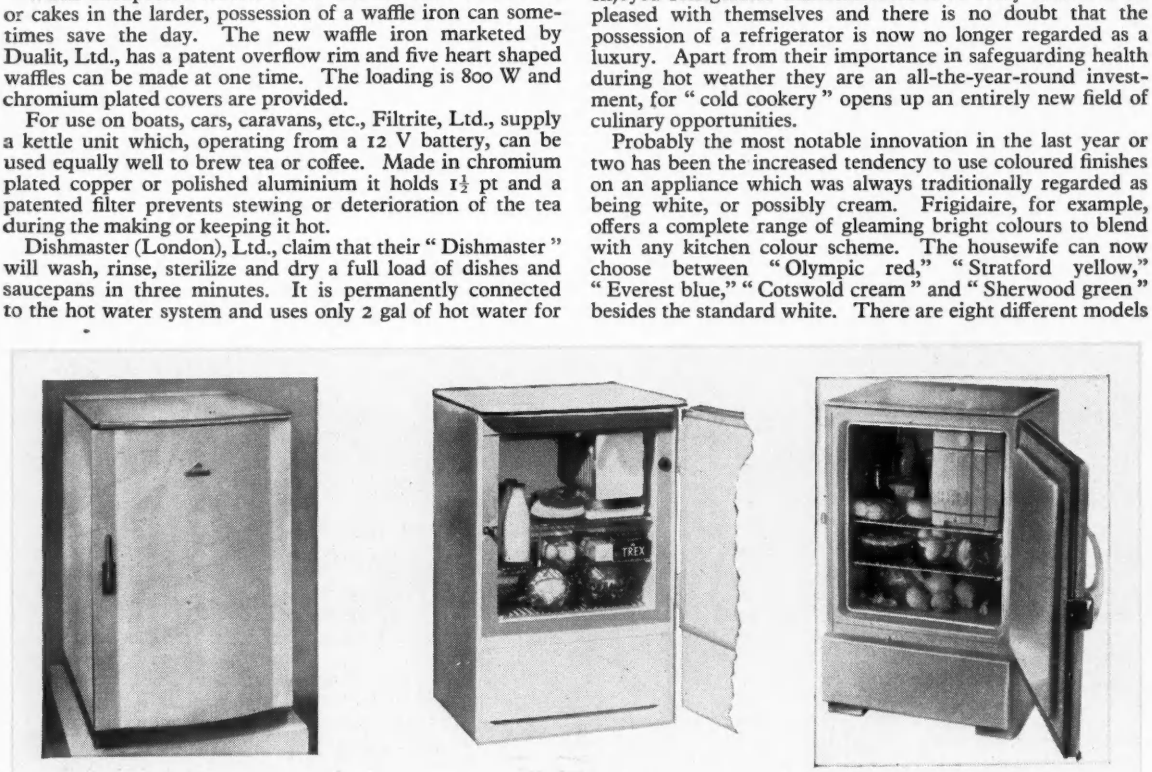
For use on boats, cars, caravans, etc., Filtrite, Ltd., supply a kettle unit which, operating from a 12 V battery, can be used equally well to brew tea or coffee. Made in chromium plated copper or polished aluminium it holds 1½ pt and a patented filter prevents stewing or deterioration of the tea during the making or keeping it hot.

Dishmaster (London), Ltd., claim that their "Dishmaster" will wash, rinse, sterilize and dry a full load of dishes and saucepans in three minutes. It is permanently connected to the hot water system and uses only 2 gal of hot water for a complete washing and rinsing cycle. Another product of this company, of special value to people in flats, is the "Wastemaster" which quickly, hygienically and automatically disposes of kitchen waste through the sink outlet.

REFRIGERATION

AFTER a summer such as the one that we have just enjoyed refrigerator manufacturers have every reason to be pleased with themselves and there is no doubt that the possession of a refrigerator is now no longer regarded as a luxury. Apart from their importance in safeguarding health during hot weather they are an all-the-year-round investment, for "cold cookery" opens up an entirely new field of culinary opportunities.

Probably the most notable innovation in the last year or two has been the increased tendency to use coloured finishes on an appliance which was always traditionally regarded as being white, or possibly cream. Frigidaire, for example, offers a complete range of gleaming bright colours to blend with any kitchen colour scheme. The housewife can now choose between "Olympic red," "Stratford yellow," "Everest blue," "Cotswold cream" and "Sherwood green" besides the standard white. There are eight different models



1. *Alaska 2·5 cu ft refrigerator.* **2.** *Wilkins & Mitchell "Servis" MSR.33 refrigerator.* **3.** *English Electric EA.34 refrigerator.* **4.** *Kelvinator C.265K de-luxe refrigerator.* **5.** *Brentford Electric "Duo-Therm" heat pump.* **6.** *Lec Refrigeration P.9 model*

in five sizes available in these colours ranging from the "Family Four" to a de-luxe 9·5 cu ft model with a super-freezer chest capable of holding over 50 lb of frozen food.

Apart from price considerations, the restricted space available in many kitchens must govern the size of refrigerators. It appears that the 3½ cu ft models are most in demand as they occupy surprisingly little floor space and their convenient table top height provides a useful working surface for various kitchen tasks. Practically all manufacturers now make a model in this class.

Although not new, the latest addition to the wide range of refrigerators made by Electrolux, Ltd., is the "L.230" 2¼ cu ft cabinet model. It employs the absorption system and the new type unit fitted to this model is claimed to operate with greater efficiency. The shelf area is 5 sq ft and this provides ample storage space for the needs of a small family. A feature new to the medium size refrigerator is the two door shelves suitable for storing eggs, small packets, etc. Another improvement is a new type of trigger door handle.

The "Astral" refrigerator (now part of the Morphy-Richards organization), available as either a free standing or table model, is also one of the absorption types. The obvious advantage of these is their quietness in operation and the fact that they cause no interference with radio or television.

An attractive all-metal cabinet with convenient plastic working table top is a feature of the 2·5 cu ft Alaska refrigerator. The three conveniently spaced shelves provide a shelf area of 5 sq ft and it also has interior lighting.

General Woodworkers' "Cresta" 1½ cu ft model has been specially designed to bring economic food preservation to the small household its overall size being kept to the minimum. Though this should fit into even the smallest kitchenette, it is also suitable for the living room. Two alternative cabinets are provided, either white enamel steel, or wood finish in walnut, oak or mahogany to blend with the user's furniture.

Among larger types is the G.E.C. 8·1 cu ft model which incorporates a full width stainless steel freezer capable of holding up to 40 lb of frozen food. Its large curved door allows plenty of space for storage racks for eggs, bottles, etc.

Two colour combinations, white enamel finish with interior fittings in Mazarine blue and a cream enamel finish with an attractive shade of turquoise green, are available for the English Electric EA 8·3 cu ft refrigerator. A new accessory is a detachable shelf in the evaporator which gives extra storage space for frozen packet foods by allowing the dessert tray and ice cube trays to be stored one above the other. Again storage door shelves are provided. The company's smaller model (3·4 cu ft) is of table top height and extra toe-room provided at the base allows one to stand and work close up to the cabinet. A choice of doors is offered, allowing for opening either on the right or the left.

There have been changes in the Lightfoot model 5 LDR and the scratch preventer is now dispensed with. The refrigerator is fitted with a complete lower shelf in place of the removable half shelf.

The Brentford "Duo-Therm" heat pump, Mark II and Mark III models of which are now available, provides a supply of hot water adequate for all bathing and washing requirements in the average household and, in addition, the same unit will provide a cold larder, claimed to be quite as efficient as a refrigerator. The cold larder thus provided does not suffer from changes in outside temperature, low temperatures being consistently maintained by the action of the heat pump and also the actual 2½ cu ft refrigerator incorporated has sufficient space for milk, butter, meat, etc. The usual facilities for making ice cubes are provided.

The only other manufacturers in the field of this type of equipment are Ferranti, Ltd., who have developed the "Fridge-Heater." This is also designed for installation in the larder and operation of the equipment embraces the principle of the absorption of heat from a chamber (larder) and the transfer of the heat to a suitable medium (water) for a particular purpose to give a hot water supply.

1. *"Prestcold" L.72 refrigerator.* **2.** *G.E.C. DE.81 refrigerator.* **3.** *Frigidaire ODT95 refrigerator*

SPACE HEATING

AS will have been seen from our recent survey of electric fires (published 23rd September) there are well over two hundred types from which to make a choice, ranging from the single-element bowl fire to the period reproduction fuel effect models costing almost £100 each, and consequently we will not attempt to describe all of these in detail. Technically speaking there is little on which to comment, consisting as they do of an element, or a means of generating the heat, and a reflector, except in the case of the firebar types, for distributing the heat where required.

The many advantages of using electricity for the purpose of domestic heating have contributed greatly to the popularity of the electric fire especially as it requires no preparation, no carrying of coal, no subsequent smoke, and consequently no ash removal. The cost of heating as compared with other forms of fuel is indeed favourable; at one time it was estimated that to heat with any electrical method was cheaper than coal for any length of time up to six hours but no doubt with the continued rise in the cost of coal this period has been extended. Most makes include one or two models of the firebar type, generally the inset or wall mounting fires, but the tendency for this kind of element to be ousted by the apparently more efficient rod type with its reflector continues.

The provision of guards on the fires is now obligatory and manufacturers have exercised not a little ingenuity in rendering them not only safe but attractive.

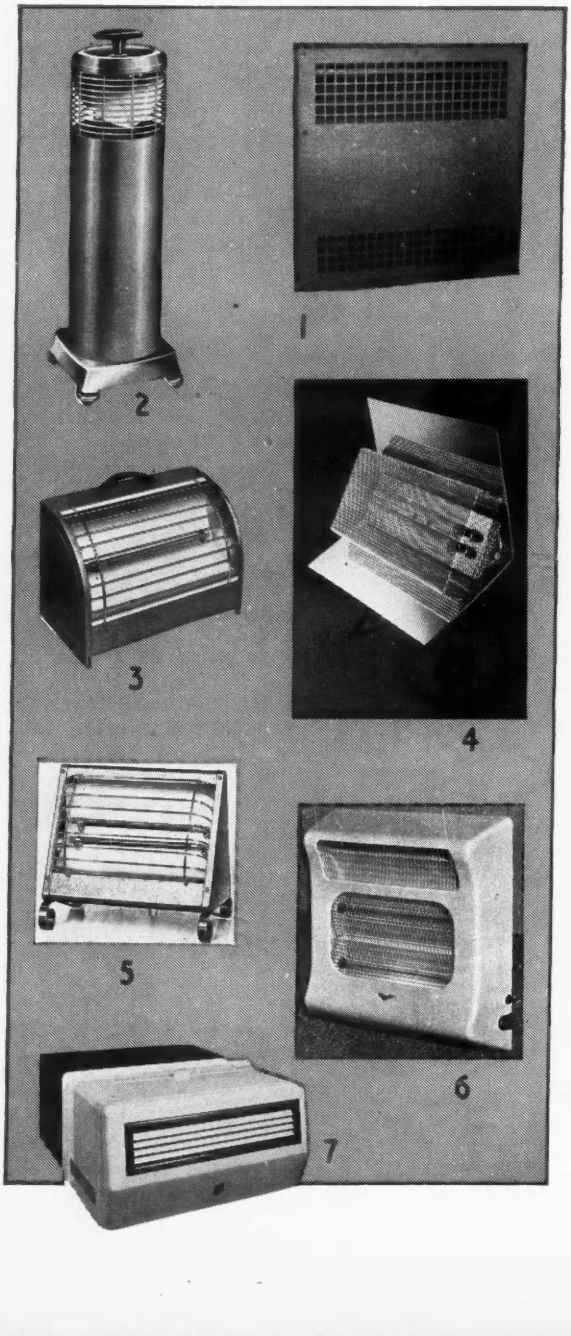
Much attention has been paid to the design of reflectors to ensure that the heat is directed where it will provide the most benefit and examples of this can be found in the new H.M.V. "Lincoln" and "Ely" fires. From anywhere within an arc of approximately 150 deg, sitting or standing, it is possible to feel the warmth beaming in one's direction, is the claim of the makers of the "Lincoln." This is achieved by shaping the reflector in a curved multi-parabolic form. It is a 3 kW fire, with a switch for half-heat. A 2 kW version is also available. For the smaller room there is the 1 kW "Ely" which incorporates a similar type of reflector. Both are finished in hammered stoved enamel grey and have concealed carrying handles.

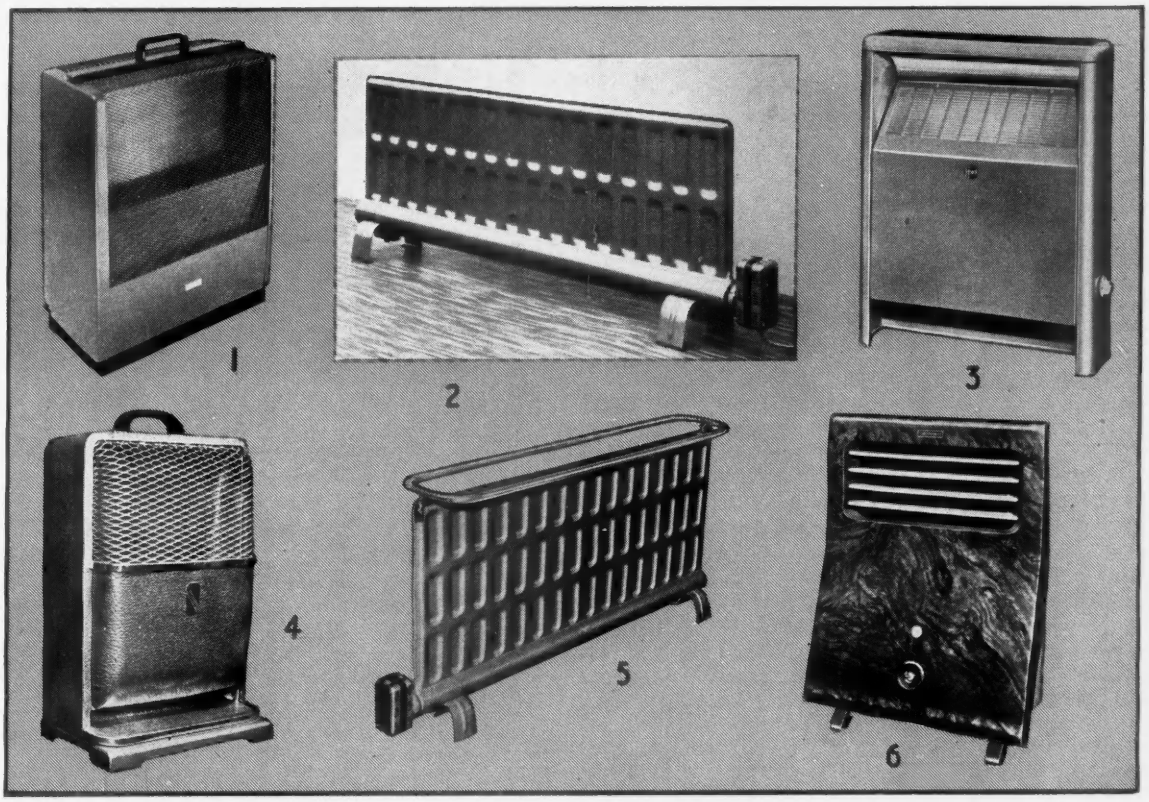
The principles governing the designing of reflectors for street lighting lanterns have been applied to reflectors in the new G.E.C. "Cosyglo" range of fires, resulting in the heat rays being thrown out evenly over a wide area of the room. The 2 kW model has an unusual, but attractive, pedestal design and is controlled by a switch on the fire allowing full or half heat. The cast base and end brackets are finished in cream or silver bronze and the reflector is chromium plated. The 2 kW screen fire is provided with side illuminations making it eminently suitable for use whilst watching television programmes. Another fire which will serve the same purpose is the new Falk Stadelmann "Felicity" illuminated fire. Unusually styled, it has highly polished reflectors enriched by a perforated metal surround which is illuminated from the interior, producing a warm cheerful glow. A larger model of the "Felicity," but with additional refinements, is the "Serenity." This has independently controlled green and amber lamps to give a choice of three colour effects—cool green for summer evenings, a cheery amber glow for cooler weather or a combination of both—with or without heat. Both of these models have a loading of 2 kW.

Two high-intensity heat elements are focused in a special discontinuous louvred reflector in the form of a large parabola in the Artic Fuse and Electrical Mfg. Co's "Sun-Glade" flood-lit fire. The louvres are floodlighted by a flame coloured lamp situated behind the reflector and the radiant heat rays are superimposed upon the light rays to produce a glowing mass effect. A smaller edition, the "Sunny-Glow" embodies similar characteristics of the larger unit, but with certain modifications in the design.

A number of attractive Ferranti fires are available with "Solium" reflectors which although of a colour similar to that of burnished copper have all the advantages of the alternative clear polished reflectors. An unusually pleasing appearance is obtained by the use of corrugated chromium plated copper in the G.B.M. models. The current range of "Nichro" fires (Cranmer & Cheshire) all employ rod type elements and the 2 kW models have a separate switch at the back for reducing to half heat. A fine mesh nursery safety guard is available for all this company's models. The Crossland "Raydant" 1 or 2 kW fire with cream stoved enamel die-cast end frames and chromium reflector is suitable for continual or occasional use. Two 2 kW fires, the R.20 "Contemporary" and the R.25 de luxe fire, the latter panelled in glass, are announced by Dexray Engineering Co., Ltd., and the Dowsing N.121 fire is mounted on a tubular frame. A remarkably large range of fires, including inset, wall, portable and convector types, are listed by Electroway Heaters and

1. Unity Heating inset convector heater. 2. M.E.M. "Circulair" 1 kW convector. 3. Pifco "Sheridan" 1 kW fire. 4. J. Scott Smith 2 kW "K" fire. 5. Grubb Engineering 2 kW fire. 6. Hobourn wall model convector heater. 7. F. H. Biddle "101" window sill air conditioning unit





1. H. Frost "Sunhouse" 2 kW convector. 2. Dimplex B.216 ¾ kW oil-filled radiator. 3. Hurseal convector heater. 4. Willectric Thermall Co.'s Mk V 1 kW convector heater. 5. Dimplex radiator with detachable double-sided towel rail. 6. Thermovent FRC1 convector heater

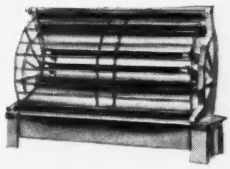
among Falco models are the "Duo" and "Solo" reflector fires. A neat 1 kW portable firebar model, the "Glotherm" is available in green/gold, cream/gold or buff from D. Haley.

In bathrooms it is essential that the fire should be installed in such a position that it cannot possibly be touched by a person whilst in the bath. Several wall mounting fires are now listed by various manufacturers, the Heatrae "Saferod" being specifically designed for that purpose. It is also, of course, ideally suitable for the nursery.

Two new models have been introduced to the M.E.M. range this season, the "Memglo" fire and the "Circulair" convector. The fire is of the flat-bar type, 1 or 2 kW, and of a simple modern design. Construction is of sheet steel for lightness and strength. The "Circulair" has been produced at a very competitive price and is sturdily built yet light in weight. As in the "Memvair" the 1 kW element is totally enclosed. It has a bronze finish, black plastic lifting handle and a light in the base reflects a cheerful warm glow.

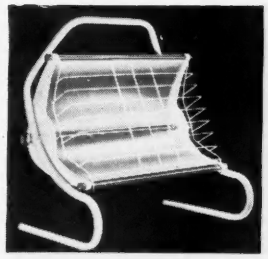
The Revo "Inset" fire is designed for slabbing into tiled surrounds and for this purpose it is supplied with a special slabbing frame. It is in various pastel shades with plated guard, and is available with "Challenge" (block type) or "Solaray" (rod type) elements in 1 and 2 kW size. The "Outset," for direct wall mounting, consists of a chromium reflector and guard with sheet metal surround. The "Tubula," "Dolphin" and "Reflexam" (wall mounting) are other popular models in the company's range.

A new Pifco reflector fire, the "Sheridan," will be seen this autumn. This is a low-priced 1 kW model and is finished in hammered silver grey or gold enamel. A neat carrying handle is fitted. Among contemporary styled fires J. Scott Smith offer the "K" in 1 and 2 kW sizes and the "Triple-K" 3 kW model. This has all-round reflection, fine mesh guards, rubber feet and two switch control. The frame is stoved enamelled in a range of colours including mustard, gunmetal, black and pink.



Crossland "Raydant" fire

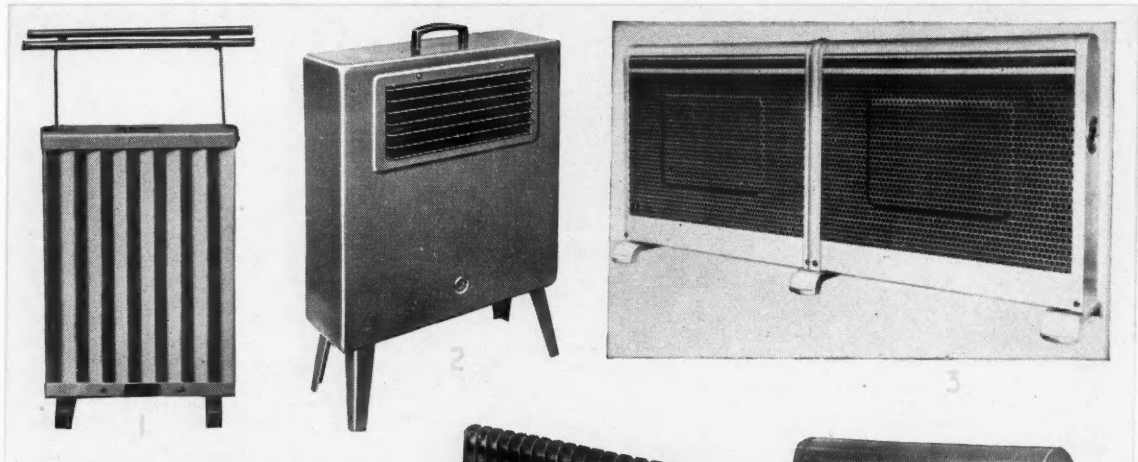
Falk Stadelmann "Caprice" 2 kW convector heater



Dowsing N.121 electric fire

Morphy-Richards, Belling and Berry's have not announced any new fires for the coming season but the last mentioned company have introduced the "Regency" imitation fuel effect fire during the year and this is now in full production. It is an addition to their now famous period models and has an antique, bright rustless finish. Loading is 2 kW.

Coal-effect fires are also obtainable from the Grafton Heater Co., who have produced two competitively priced models, one of which, with a loading of 750 W, retails at



1. Drydenair "Airo" radiator fitted with double towel rail. 2. Hounslow "Albany" convector heater. 3. Berry's "Raydair" 880/2 convector. 4. Key Leather K-L fan heater. 5. Steel Radiators model 1 oil-filled radiator. 6. Ferranti background heater

less than £3 10s, including tax. It is strongly constructed of heavy gauge steel with chromium reflector and employs a vertical single rod element. No flickering device is fitted. The larger model is of a similar construction and rated at 2 kW. Control is by individual switches and a flickering device is provided.

The range of Berry's "Raydair" heaters includes 1, 1¼, 1½ and 2 kW models and particular attention is to be given to this form of background heating this season. A feature of their design is the air duct by which all the heat which would normally be given off from the back of the heater is deflected forward, ensuring that none is wasted heating the brickwork of the wall behind. All "Raydair" heaters are finished in peach bronze or penny-bronze and equipped with a variable thermostat and pilot light.

A very large selection of inset and wall panel fires is offered by H. Frost and Co., manufacturers of the well-known "Sunhouse" range. Their latest production is a 2 kW convector and their range of "Sunhouse" convectors now consists of four models, ¾ kW, 1 and 2 kW (with half-heat switches) and the new 2 kW thermostatically controlled model. All are stoved enamelled in a warm hammered brown shade and the plinth is in black.

Wall mounting low temperature panel heaters loaded at approximately 75 to 80 W sq ft are among new lines of Unity Heating, Ltd. These can be varied in size to suit customers' requirements. The company's "Wode" convector can be flush mounted in walls. It is available in 1 and 2 kW sizes and finish is either bronze or silver grey. A skirting panel heater is also announced. This is designed to take the place of the conventional skirting board and is normally loaded at 60 W per ft run.

A point where many people feel the cold and draughts most is near the floor and the latest Willectric Thermall Co.'s radiant and convector heater has been designed to overcome this. The mark V model radiates heat from the lower aperture and warm air is diffused from the upper opening to circulate into the room. The heater is of 1 kW loading and supplied in embossed or plain metal with a fawn finish. C. Hounslow and Co., in addition to their comprehensive range of electric fires, introduce the "Albany" convector heater. The dual purpose model (No. 37) furnishes both convection and radiant heat with separate switch control. A new de-luxe "Cotswold" fan heater is available from Gillott Electro Appliances, Ltd. In addition, Drydenair, Ltd., have announced their new type radiator the "Drydenair-Airo." Ranging in sizes from 250 W to 1½ kW it is light in weight and occupies only a small amount of space. Double towel rails can be supplied.

Twelve different types of Benham "Electro-Vapour" water filled radiators are supplied, from 1 to 3 kW, and among oil filled types Steel Radiators, Ltd., have models available in ½ to 2 kW sizes. Several additions have been made to the already large Dimplex range and latest introductions include two 2-dimple high radiators, models B.216 (¾ kW) and C.220 (1 kW), and a 1 kW column type radiator. The last is supplied with standard feet but castor wheels can be fitted if desired. Single and double sided towel rails for models ER.316 and D.416 are also announced. The Hurseal "Popular" is an attractively priced 1 kW column type and should provide the answer to the demand for a radiator where thermostatic control is not necessary. This heater is supplied with a thermal cut-out instead of a thermostat, making it, claim the manufacturers, the lowest priced radiator of its capacity available.

G.B.M. manufacture a complete range of five panel type oil filled radiators and four column models from ½ to 2 kW, all of which can be fitted with "Easy-Flo" castors. Adaptable towel rails are available for the panel type and ornamental wrought iron frames, designed to harmonize with

most surroundings, are for use in conjunction with column radiators. In addition to their three "Ocean" oil filled portable radiators, Hobourn Domestic Appliances, Ltd., produce a neat wall model convector and portable floor standing model. The Hobourn nursery heater uses a patent black heat element and even when the heater is accidentally knocked over by children there is little danger of its scorching the carpet.

Apart from the wide range of attractively cased "Thermovent" convectors of the more conventional type, E. K. Cole, Ltd., also manufacture the "Radiant Glass Thermopanels" in which the element is fused directly to armour-plate glass. Due to the low heat conductivity of glass no blistering is caused to the hand by momentary contact and there is little danger of the elements burning out. A feature of the inset "Thermovent" heaters is that they can be built into walls or furniture without any risk of scorching and no insulation is necessary in the recess.

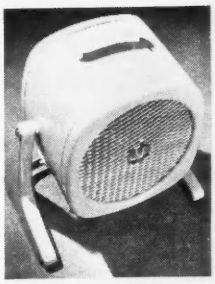
Tubular heaters, though not so spectacular in their operation are nevertheless still probably the cheapest equipment for heating being ideally suitable for such applications as halls, garages, airing cupboards, etc. A means of transforming any cupboard into an airing cupboard is provided by H. G. Poxon Engineering Co., manufacturers of the "Herga" wardrobe airer. The 100 W element is sealed in a panel of tough insulating plastic and a plated frame holds the heater either horizontally or vertically. The panel measures 11in by 16in. Larger sizes and heavier loadings for wall mounting are also available. These are supplied in a natural mottled brown colour and can be covered with heat resisting paint to match existing surroundings. Besides supplying panels for walls, ceilings and dados, etc., Panelec (Gt. Britain), Ltd., carries out complete floor heating installations employing heating cable in aluminium channels sunk into a concrete flooring with expanded metal to disperse the heat.

Most people will readily agree that when the hall and landings of a house are cold the whole atmosphere of the house seems chilly. However, with the introduction of the "Heatpac" (F. H. Biddle, Ltd.) a new form of circulated warmth is immediately available. Designed to operate on an indirect hot water system it can be recessed into a wall or beneath a hall stairway. Incorporated in the cabinet are two electrically driven propeller fans and a small pump to provide water circulation through the heating element, all of which are controlled by a switch situated on the front panel of the unit.

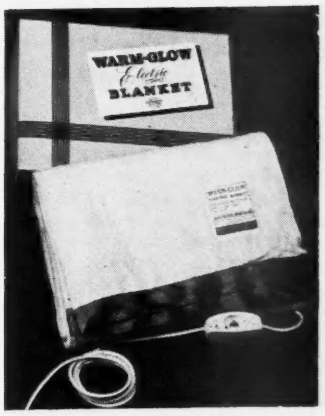
Where not only the heating of a room but also its air conditioning is desired use can be made of the Biddle "101" and "51" air conditioners. Installation is simple and no floor space is required as the unit rests in a specially designed cradle which fits easily on to a window sill. Similarly the E.C.D. room air conditioner, with its adjustable temperature control, should help solve the problem of ventilation. No doubt this problem is greater in the kitchen than any other room in the house and the provision of a window fan is a highly desirable amenity for the removal of cooking odours, steam, etc. Typical appliances for this purpose are the "Vent-Axia" electrically driven ventilating units, now made in four sizes and designed primarily for window fitting. The "Reversible" models provide five speeds of extract or intake ventilation as required, whilst type "X" are supplied as either extract or intake units. An iris shutter is available as an attachment for these.

A new home accessory which warms the room in winter and ventilates it in the summer is produced by the Key Leather Co. The "K-L" fan heater is built into a steel frame, the element being mounted in front of a multi-bladed

"Thermat" QM de-luxe single bed blanket



Gillott de-luxe "Cotswold" fan heater



Right: Warm-Glow "Popular" electric blanket

1. Thermalux electrically heated mattress overlay. 2. Dowsing "New Popular" blanket. 3. David Griffin "Dee-Gee" safety blanket with transformer. 4. Hurseal electric bed-sheet

fan. This frame is so designed that it not only protects the heater but also acts as an airing rack for small items of laundry. The heater can be either placed on the floor or on a table or shelf. Its contemporary design blends well with modern décor and the finish is cream stoved enamel. Models are available without the airing frame.

Unlike the old fashioned hot-water bottle the electric blanket gives a constant heat for an indefinite period. Manufacturers who list probably more types than any other company, Milliwatt, Ltd., not only specialize in the standard blanket, but also electrically heated foot muffs, gloves, eye and ear pads, and flying suits. Best quality soft fleecy blanketing is used in the manufacture of Permaheat blankets the latest of which is a single-heat "Popular" model. Measuring 50 by 24in it employs no thermostat and is available in four pastel shades of pink, green, gold or yellow.

A feature of the new blanket of Windak, Ltd., is a detachable all-plastic lead which is specially designed for the easy removal of all electrical parts to facilitate laundering. The element is woven, by hand, into the foundation of the "Wye Valley" blanket and the makers state that this year they are introducing coloured covers on the blanket itself, blue, green and peach, and also striped washable covers in three shades.

An infinitely variable and fully automatic heat control is available from Thermoset Appliances, Ltd., for use with their blankets, the device maintaining a selected temperature indefinitely no matter how long the bed warmer is left on. Warm-Glow, who claim to have introduced the first single-heat blanket with no thermostats over twenty years ago, this season introduce a new "Popular" range in junior, single and double sizes. Each of the models has two voltage ranges. The "Siesta" single-bed blanket manufactured by Thermolectrics, Ltd., measures 60 by 30in and maintains a temperature of 140 deg F.

"Paramount Gold Label" and "Summit Blue Label" blankets are all single-heat models of the radiation controlled type, and are waterproof. These are products of Electro-Medical Blankets, Ltd., and are available in shades of pink, blue and green. Quilted, super sateen outer covers are supplied with Thermat "QL" de luxe, "QJ" and "QM" blankets, none of which interferes with radio or television reception.

A blanket that tucks in all round the bed, the Isopad "Lana," is again made in two sizes, 60 by 80in overall, with the heated section increased to 36 by 54in. The double bed size (10 by 80in) is now made with two separate three-heat controls so that each sleeper can arrange the heat to his or her own liking. A more conventional single-heat and three-heat blanket as well as the Isopad "Master" three-heat pad are also announced. All Iso-blankets are now made in two voltage ranges.

An "All-Night" blanket, made by Denhams (Nch.), Ltd., will have a strong appeal for nervously inclined people as it does not operate direct from the mains, but through a transformer, reducing the supply to 12 V.

Many of the double bed sized blankets are fitted with dual control so that the temperature of each half can be regulated independently. This feature is also incorporated in bed sheets manufactured by Chalfont Electrical Products, Ltd., whose lightweight appliances are washable and waterproof. They are supplied in transparent containers enabling them to be safely packed away during the summer months.

As opposed to the bed sheet there is an electrically heated mattress overlay obtainable from Thermalux Electrical Products. Five models are available and these completely cover the top of the mattress; in the summer months they can be readily rolled up and stored away. The equipment is thermostatically controlled and with an average use of half an hour a night the weekly electricity consumption is only 1 kWh. In addition to its heating features the overlay is claimed to protect the mattress and add considerably to its life, especially in the case of the spring interior type.

There are, of course, many more makers of blankets and pads than we have space to mention here, but all details of these may be found in our issue of 12th August when we dealt with these appliances.

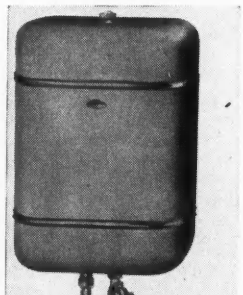
WATER HEATING

To have hot water always ready, whenever it is required, provides a new heart for the busiest place in the home—the kitchen. Thermal storage models are available from 1½ gal sizes upwards in free outlet, pressure and cistern types and nowadays with the increasing tendency to introduce colours, such pastel shades as blue, parchment, green, etc., in addition to the conventional white, they can be obtained to blend with most kitchen colour schemes. Their rounded corners and smooth surfaces are easy to keep clean.

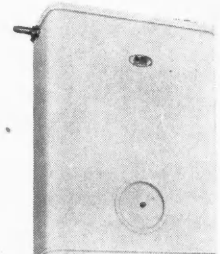
The new Heatrae "Lido" range, introduced only a month or two ago, has a streamlined space saving design and a new concealed fixing system simplifies fitting and cuts installation costs. These water heaters are made in 1½ and 3 gal sizes for supplying hot water to one position only, such as a kitchen sink or wash basin. Experience has shown that the average household needs are amply served at the sink by using a 1½ gal heater. Now that a choice of loading is available, i.e., 750 or 1,000 W, this smaller size is probably favoured on account of its economy, size and low cost.

The cistern type water heaters are intended to supply a number of taps and in addition to being economical to run they are entirely automatic in operation. With a capacity of 20 gal and a loading of 2 or 3 kW, it is estimated that a little over 3 gal of really hot water is obtained for each unit of electricity. A typical example is the Sadia type UDB/BT which is suitable for either wall or floor mounting. The Creda "Dulec" is a fully automatic water heater which combines two hot water systems in one, provided for the immediate supply of large or small quantities as required, by the use of two separate thermostatically controlled banks of heating elements. It has a 500 W element, permanently in circuit, in the upper part, providing 6 gal of hot water at one time, and a 2½ kW heating unit at the bottom which can be controlled by a foot press switch for larger quantities for such purposes as the wash-day or baths. Berry's Electric also have their "New Look" water heater available in attractive pastel shades for both the 1½ and 2½ gal models.

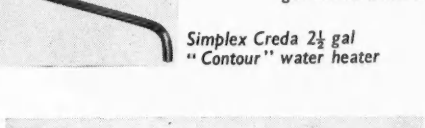
To save the housewife fuel and money, the G.E.C. has designed a dual-service immersion heater which is virtually two immersion heaters in one. It employs two elements the shorter of which heats the water down to its own depth and no further. This quickly provides a few gallons of hot water at the top of the tank, sufficient to ensure that hot water is always available for the sink, and the longer element, which



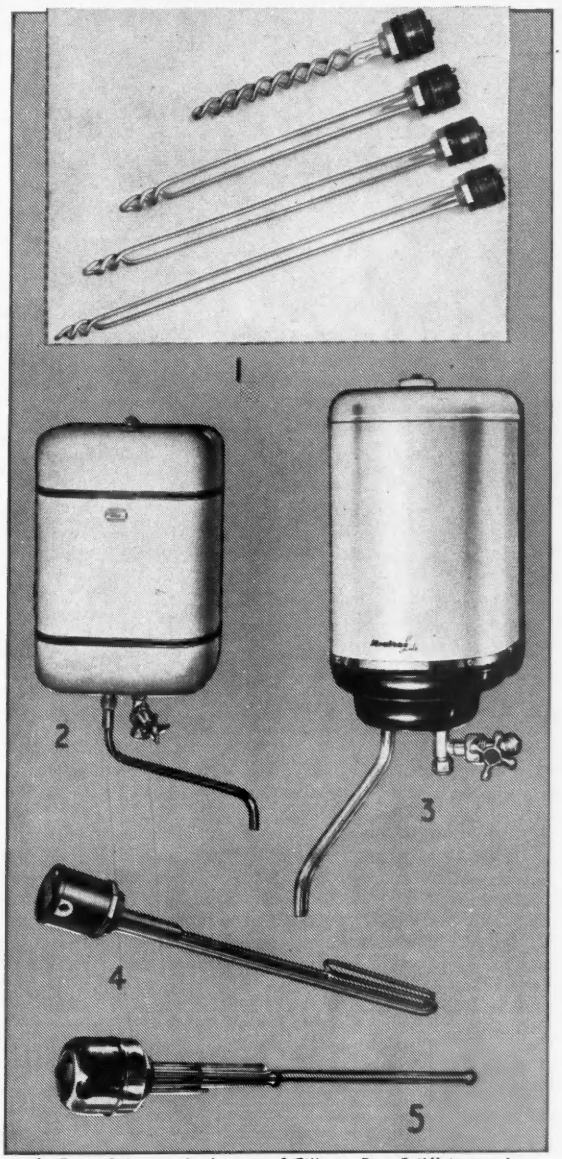
Simplex Creda 2½ gal "Contour" water heater



G.E.C. "D.E.1715" 15 gal cistern water heater



Benham 12in immersion element with thermostat



1. Four of the standard range of Gillott "Duo Coil" immersion heaters. 2. Berry's 2½ gal "New Look" water heater. 3. Heatrae "Lido" water heater. 4. Simplex "Redhead" non-automatic immersion heater. 5. Santon "Dual" Q type DUO/TIQ immersion heater

heats the entire tank, is brought into use only when larger quantities of water are required. To control the shorter element, a thermostat, which is sold separately, can be fitted.

A new, cheaper, type of thermostat is becoming available and Geo. Bray & Co. are arranging for their LAMS and LAQD type of domestic immersion heaters to be fitted with any of these by the end of this month. The "Stellex" range of immersion heaters (C. H. Blackburn & Co.) are made with 2, 3 and 4 kW ratings with universal lengths ranging from 12 to 42in, and Gillott continue with their "Duo-Coil," believed to be the only heater with a replaceable thermostat micro-switch. Prices of the G.B.M. models are reduced and this company has introduced new embedded type element "Black Head" immersion heaters fitted with a 2¼in head and thermostat pocket; the loading is 3 kW.

The Hotpoint "Twinimerser," as with standard immersion heaters, may be automatically controlled but unlike dual-purpose heaters it requires only one thermostat and incorporates a built-in change-over switch. In operating the switch from the sink to the bath position, or vice versa, a link mechanism rotates the blade through a friction drive and resets the thermostat adjustment. The two elements cannot be in circuit at the same time. Apart from their normal range of immersion heaters, Eltron, Ltd., produce various portable units for heating small quantities of water in unheated washing machines, small containers, etc.

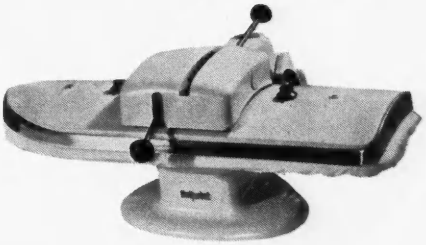
LAUNDRY

THERE is probably no other branch of household activities that provides as many opportunities for the use of electrical labour-saving apparatus as the home laundry. This fact has long been recognized by the manufacturers of this type of equipment and judging by the number of different types and sizes of washing machines, wash boilers, irons, etc., that are now available, the needs of even the most fastidious housewife should be satisfied.

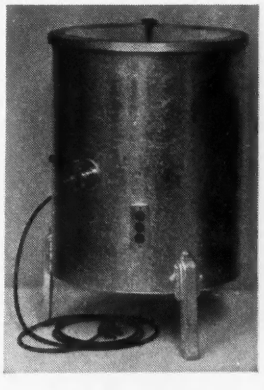
Undoubtedly one of the most noticeable tendencies with regard to washing machines and their design is the increasing provision of facilities for heating the water. Not only does this permit the boiling of clothes if desired, but it meets the requirements of those who have no separate water heating system. Well over half of the makers produce heated models. The new W.130 and W.140 B.V.C. "Goblin" washers are both equipped with a 2½ kW heating element and the latter also has a powered 12in wringer and pump. Another innovation is that the agitator is constructed of white indiarubber.

Another manufacturer that has introduced a heater within recent months is the Hotpoint Electric Appliance Co. The model "CH/P" machine incorporates a 3 kW thermostatically controlled "Torribar" heating element. This is situated in the base of the aluminium bowl immediately under the gyrator and full protection of the element under boiling dry conditions or accidental switching on is ensured by the inclusion of a safety device. The heater control incorporates a pilot lamp.

A version of the Hoover Mark II washing machine incorporating an electric heater is also being marketed. So far it has been introduced into Scotland, Jersey and other



Hotpoint table ironer



Dugdale wash boiler

Monarch "Handiwash" boiler

1. Wilkins & Mitchell "Servis" electric washing machine ("Superheat" model). 2. Hotpoint clothes dryer. 3. Euk "Homepride" clothes dryer. 4. Servis "Superheat" washing machine with rotary ironer attachment. 5. C.W.S. "Dudley" washing machine. 6. Burco 122 boiler/washer. 7. South Wales Switchgear "352J" wash boiler with agitator

selected districts in the Midlands and the North of England. It is hoped in due course to extend this distribution, but no date for this is at present available. The heater has a 2 kW element which has been set at the bottom of the tub behind the grille. This has been done without altering the size of the machine or the tub. There is a protective device so that if the heater is used without filling the tub with water a knob at the back of the machine is ejected and the heater is automatically disconnected to avoid overheating. The heater can be reset by pressing the knob back into position. Operation of the Mark II machine is on the same principle as that used in the Marks I and III machines.

Among the other makes now available with heaters are the "Aqa," Burco, "Prefect" (Clegg & Coupe), English Electric, "Ewbank" (Entwisle & Kenyon), Fisher, Parnall, Summerscales, Universal Boilers and "Servis" (Wilkins & Mitchell).

Details of the larger type washing machines such as the Bendix and Thor have been given on many occasions in the past so we do not propose to say more at this stage except that Parnall (Yate), Ltd., have recently acquired the interests of Thor Appliances, Ltd., in the United Kingdom and are now solely responsible for the manufacture and marketing of the Thor automatic washer in this country. The Parnall E.W.50 washer is still in production. Its features include easy glide castors enabling it to be moved effortlessly from storage place to sink, automatic pump operation, powered wringer and a table top which readily converts into a useful kitchen work table. There is a heated model, the E.W.50H.

Another newcomer to the market is the Prefect "Princess" cabinet type washing machine recently introduced by Clegg & Coupe, Ltd. This machine has a capacity of 5½ lb and the cabinet is fitted with a vitreous enamelled top, the remainder of the machine being finished in a cream stoved enamel. The 11in reversible roller/wringer can be swung in four positions over or outside the cabinet and the pressure release is effected by a drop bar. Provision is made for the wringer to be stowed inside the cabinet when not in use. It is very compact and occupies little floor space, measuring only 19in square. Both boiling and non-boiling models are obtainable.

The Fisher model "ER.II" has a specially designed fast heating element, claimed to be the quickest on the market. It has a capacity of approximately 8 lb of dry clothes and is provided with a powered wringer. The same company's model "L" is also fitted with a driven wringer, and provision is made for a rotary ironer. This model is available with a pump at extra charge. A thermometer showing water temperature is fitted on the front of the English Electric heated washer making it possible to select the correct temperature for different types of fabrics.

John Senior Co.'s "Joy Heat-o-Matic" washer is fitted with push-button control and the motor and heater units are mechanically interlocked. Up to 8½ lb of dry clothes can be accommodated in the family sized tub, and a power driven wringer is fitted. The "Joy" standard machine is a similar model except that a heating device is incorporated. A neat, compact unit occupying only 16in square of floor space and yet capable of handling a full family wash is available from Easiclene. The built-in, fold-away wringer takes handkerchiefs or blankets without adjustment and a draining hose is provided.

A novel portable device which utilizes the sink for washing is made by Carefree Domestic Appliances, Ltd. It has several of the advantages of the conventional washer and operates by water movement alone, impeller blades circulating the water powerfully through the clothes. It can also serve the purpose of a dish washer. Most wash boilers are available fitted with safety devices to prevent damage to the elements in the event of being inadvertently switched on when empty, or left to boil dry. Though a little more expensive cabinet type wash boilers are chosen by many, perhaps for their smarter appearance, but nevertheless their number does not exceed that of the round type.

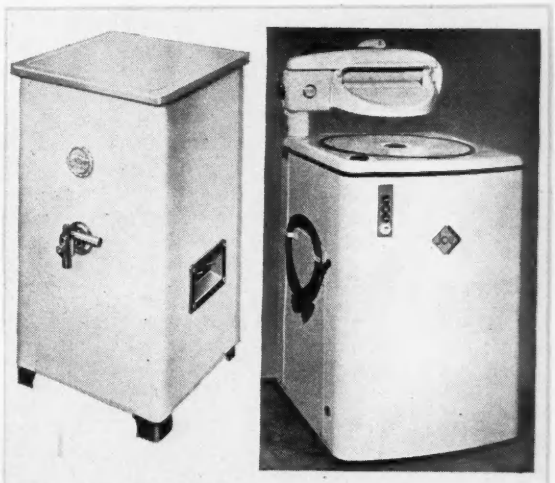
The G.E.C. cabinet wash boiler is designed to fit in with the furnishing of the modern kitchen. It is small enough to "tuck away" yet has sufficient capacity for 8 lb dry weight of clothes per charge. A three-heat switch and an automatic cut-out are provided. The tap is fitted with a non-splash device and a hose connection which is particularly useful when the boiler is used for heating water for auxiliary cleaning.

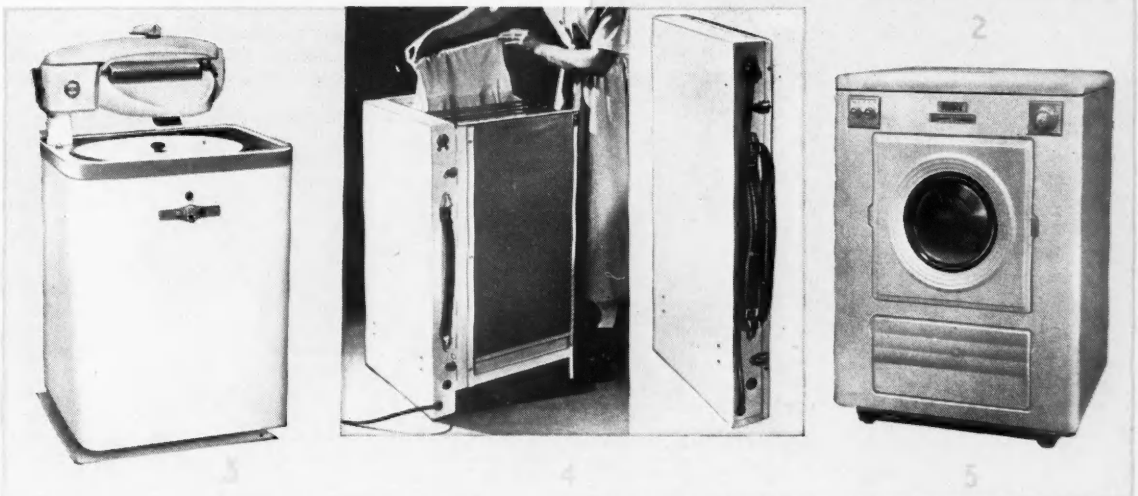
The latest wash boiler to be announced by Burco is a compact 5 gal model to be known as the "Baby Burco." It is ideal for the small kitchen and measures less than 20in high and fits neatly under the sink. The container is of spun aluminium with anodized finish and the lid is provided with a heat-resisting knob. Another one of the more popular range of Burco machines is the combined wash boiler and washing machine. Basically it is a wash boiler with a gear box power driven agitator. It is fitted with a three-heat rotary switch control and a warning light.

A welcome addition in the form of a hand driven agitator unit may be obtained for use with the South Wales Switchgear wash boilers. Dugdale Manufacturing Co., manufacturers of wash boilers for over 25 years, offer a strong galvanized sheet steel type fitted with aluminium lid and tinned copper inner container.

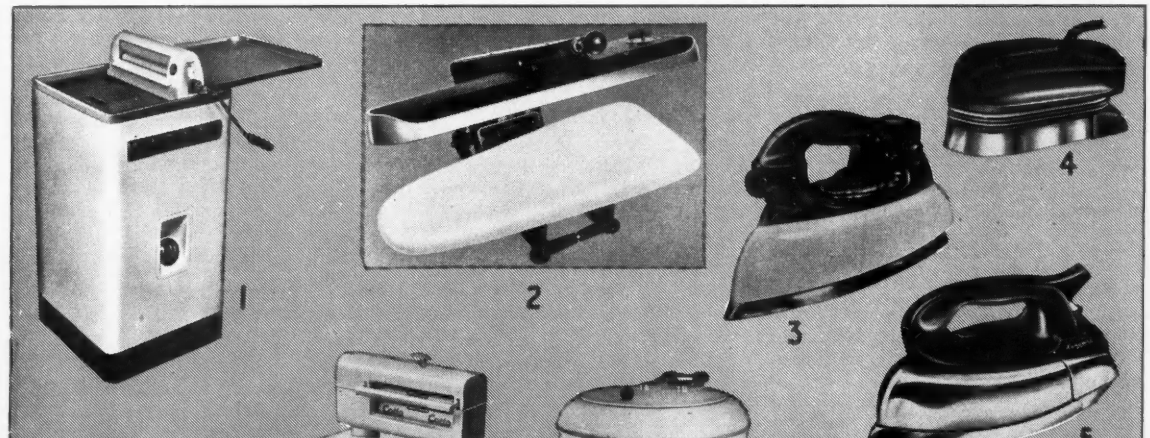
Smaller type boilers having a capacity of approximately 4 gal are available from such firms as Monarch Electric, Bulpitt, Chalfont Products, F. J. Tomlinson and Lamb, Hingley. All of these are of galvanized steel construction and are not unlike pails in appearance, although, of course, larger. L. G. Hawkins "Dinky" boiler is of heavy seamless aluminium and has a capacity of 3 gal. This is fitted with a draining basket for clothes and can also be used for fruit bottling purposes.

An electric iron is now accepted as being an almost indispensable item of laundry equipment and perhaps the chief point to mention here is the realization that light models (2 to 2½ lb) are now just as capable of dealing with the average weekly ironing as the heavier (4 to 5 lb) types. One of the lightest G.E.C. models is the 2½ lb "Bride's" iron and its continued sales seem to emphasize the fact that this can be as satisfactory as the heavier types. Similarly, the Morphy-Richards lightweight "Atlantic" iron retains its popularity. A competitively priced streamlined iron, the Welec "Glide-Eesi," has just become available from F.





1. G.E.C. "DE 4760" cabinet wash boiler. 2. "Joy" washing machine (John Senior & Co.). 3. "Longford" washing machine fitted with power wringer. 4. "Dryette" clothes dryer and airer shown open and closed (Coventry Radiator). 5. Bendix automatic home washer



1. Hoover Mk. II washing machine with heater. 2. Parnall "Ezy-Press" ironer. 3. Morphy-Richards steam iron. 4. Lucas Holder travelling iron. 5. Kenwood "Steam-o-matic" iron. 6. Baby Burco 5 gal water boiler. 7. Cotto Products washing machine. 8. Morphy-Richards spin dryer. 9. Hoover "Steam-or-Dry" automatic iron

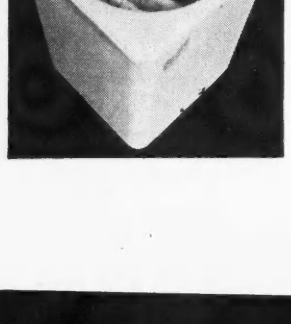
Westerman (Wholesale), Ltd. It has a highly polished nickel-plated body and moulded handle, and the weight is 4 lb. Loading is 450 W and it is suitable for the 200/220 and 230/250 voltage range.

The disadvantages of a trailing flexible cable are overcome with the J. & H. Walters and Donaldson no-flex irons. These are automatically plugged into an electricity supply only between ironing operations. The "Mary Ann" iron (Thorn) is pointed at both ends to facilitate ironing and the "Victor" safety iron (Bylock), by a simple and ingenious design, lessens fatigue and the risk of scorching. No stand is required as the moment the hand is removed from the iron the hot sole-plate lifts itself from the work and rests on the cool heel. The number of steam irons on the market still remains at three, namely, Hoover, Morphy-Richards and the Kenwood "Steam-o-Matic."

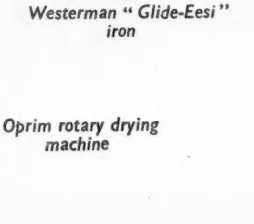
A swivel device is a feature of the Hotpoint "Plus Five Rightweight" iron, allowing the flex to take up a natural position as the iron travels the ironing board. For those who like to carry out ironing duties whilst comfortably seated, the company's table ironer will no doubt be welcome, or even the rotary ironer which can be fitted in place of the wringer on to the washing machine. With this method both hands are free to guide the clothes.

On wet days the drying of clothes need no longer present a problem as several clothes drying cabinets are available. These also have the advantage that the clothes can be dried in a clean atmosphere. Less than $2\frac{1}{2}$ sq ft of floor space is required to dry the equivalent of a full line of washing when use is made of the Coventry Radiator "Dryette." When not required it can be folded into a neat cabinet measuring only $3\frac{3}{4}$in wide.

Another neat portable clothes dryer and airer is the Hotpoint model, the dryer being supplied with an enclosing cover of fabric material. The Oprim rotary drying machine is claimed to dry the washing in precisely the same conditions as out-of-doors. The clothes are slowly rotated inside the machine and are subjected to a constant low-pressure air stream. Heating is by means of an infra-red system and the loading is 2 kW. The cabinet is of pressed steel and is stoved enamelled cream throughout. Ideal for flat dwellers, the Morphy-Richards spin-dryer holds a normal load of washing and yet takes up very little space, being only 17in in diameter by 25in high. The Euk "Homepride" dryer is a full cabinet sized model standing 6ft in height. With a loading of 3 kW it prepares a complete family wash for ironing in less than an hour. Speed of operation is a feature of the English Electric tumbler dryer which is fitted with an automatic timer, graduated to 90 minutes, and switches off at the end of a pre-set period. It is capable of holding up to 16-18 lb, wet weight, of clothes.



Oprim rotary drying machine



Westerman "Glide-Eesi" iron

CLEANING

THOROUGH but gentle cleaning is the only way with carpets, furnishings and fabrics and the present day electric vacuum cleaners have contributed much to this end. In all there must be over fifty models from which to choose but obviously the choice will depend on individual requirements. For the larger type of house where considerable expanses of carpeting may be found the upright or bag type cleaner will probably be favoured but on the other hand where it is necessary to continually deal with staircases, walls, furniture, etc., the cylinder cleaner, because of its greater manœuvrability, and additional accessories, is probably more suitable.

Hand cleaners are also very popular and one of the very latest Hoover developments, an entirely redesigned "Dustette," is now provided with a special strap that fits through a slot in the carrying handle enabling it to be slung over the shoulder, making it easier for the user to move small pieces of furniture and to guide the cleaning tools. It also has a throw-away bag for hygienic emptying and is supplied with an extension tube, flexible connecting hose, two cleaning brushes and a crevice tool.

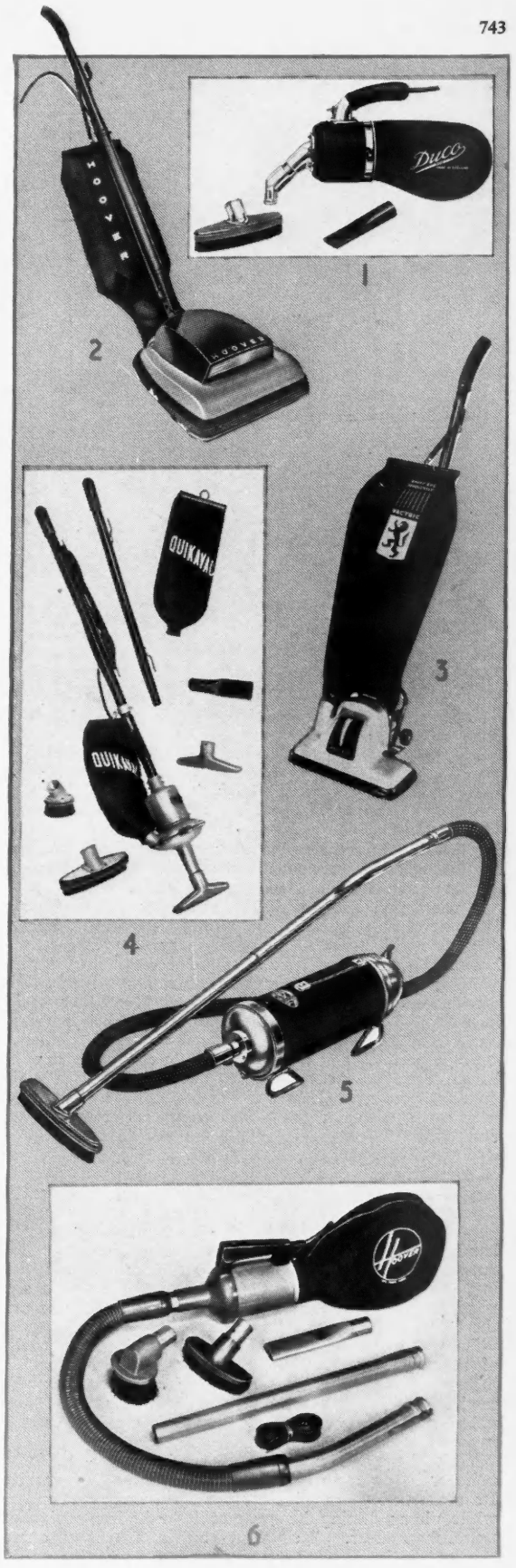
In addition to the new "Dustette" Hoover also announce an entirely new version of their standard upright cleaner, to be known as the "638." The dust bag is of glazed rayon and has a slide fastener, permitting the task of removing the dust in the throw-away bag to be performed speedily. An easily carried hold-all carton is provided for the comprehensive range of cleaning tools, including three brushes set in soft flexible plastic and a crevice tool. The "Dirt-finder," with its beam of light, helps to find dirt in dark corners. Control is by means of a foot switch and the finish for both new cleaners is medium blue and grey.

Another upright cleaner which has made an appearance since last year is the G.E.C. DM 380. The double insulated motor employed is suppressed for radio and television and in addition to the usual flexible hose and extension tube an upholstery tool, floor and wall brushes and a crevice tool are supplied. Maroon and grey make an attractive finish.

Modern styling is the keynote of the three new B.V.C. "Goblin" cylinder models, "Clean Sweep," "Triumph" and "Ace." The last is an exceptionally powerful model and yet surprisingly silent in action. The popular "Regal" upright completes their range. C.W.S. have improved their "Invincible" cylinder model and a foot switch is now fitted on the cylinder top. A three-stage impeller motor gives extra powerful suction. Two cleaners are offered by R. Cadisch & Sons, including a hand model incorporating a rubber hand grip.

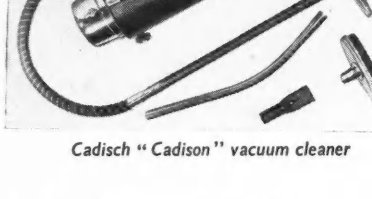
A simple, yet highly efficient, attachment for use with the Electrolux "55" cleaner is the turbo-polisher attachment. This can be either attached to the end of the hose for dealing with furniture or to extension tubes for polish-

Siroma hand cleaner and (left) Electrolux turbo-polisher attachment



Right: **1.** *Brown Brothers "Duco De Luxe" hand cleaner.* **2.** *Hoover Model 638 vacuum cleaner.* **3.** *Vactric "R.53" vacuum cleaner.* **4.** *Nash "Quikavac" vacuum cleaner.* **5.** *Express vacuum cleaner.* **6.** *Hoover "Dustette" with cleaning tools*

Cadisch "Cadison" vacuum cleaner



Left: The range of "Goblin" vacuum cleaners includes the "Clean Sweep" (A), "Triumph" (B) and "Ace" (C)

G.E.C. auto-switched floor polisher

Electrix "Halcyon" polisher and scrubber

Right: C.W.S. "Dudley Junior"

ing floors. Accessories include two sets of brushes, one for waxing and one for polishing, and two buffs for finishing, felt for floors and lambswool for furniture and cars.

A vacuum cleaner which also carries out the duties of a floor polisher is the Fillery "S.P.3" machine. Suction dispenses with the need for preliminary sweeping and also helps to harden new wax by rapid drying. Buffing and sanding are other floor treatment operations which can be carried out with the Truvox "Juno" polisher which incorporates an inner brush for dirt removal. A rubber buffer ring prevents damage to furniture and wall skirtings.

The new G.E.C. floor polisher is light enough to be easily handled, yet heavy enough for efficient polishing. It is also double insulated for maximum safety in service and fitted with a television and radio interference suppressor device. Strikingly different from previous designs it is of metal construction, has a plastic handle, brush guard and buffer, and all corners are well rounded to prevent damage to furniture. A foot-operated button releases the plastic handle from its normal upright position after which the polisher can be automatically switched on or off by lowering or raising the handle. The cleaner's two bristle brushes which are splayed outwards for maximum coverage and close-to-wall polishing, are easily removed for cleaning and two felt pads, supplied to give an extra gloss, are simply fixed in position over the brushes by a press button.

Low set housing for polishing under furniture is a quality of the Bylock "President," a three-brush model which incorporates scrubbers, scourers and polishers. Another model with a three-brush action is the Electrolux "Quiet" polisher which, as its name suggests, is particularly quiet in action.

With the addition of scrubbing brushes the Hoover polisher becomes an effective and labour saving scrubber. Its construction provides for polishing beneath furniture while a lamp shining through a grille in the front points out unpolished areas. Wet scrubbing is a facility offered by Electrix, Ltd., manufacturers of the "Halcyon" polisher, and Columbus-Dixon, Ltd., whose "Columbus" suction floor polisher has, in addition, attachments for suction floor drying, suction cleaning and dusting.

LIGHTING

THE importance of good lighting in the home cannot be overstressed. Whereas at one time a single pendant fitting in any one room was considered sufficient the tendency nowadays is for more and more wall brackets, table and standard lamps, etc., which are valuable as a means of decreasing the risk of eye-strain and indicate an appreciation of the extra comfort to be derived from local lighting.

Although the main demand is chiefly for the more conventional type of fitting the popularity of "contemporary" styles with their added elegance, striking colours and, in some cases, even more striking designs, continues to grow.

As an example, a floor standard shade chosen at random from among the many new designs in both modern and contemporary styles listed in the Knightshades catalogue, is mushroom shaped, and manufactured from "Nylux" with large polka dots in pink, gold, green, red or blue. This fitting (No. 1185) measures 26in in diameter. In addition to lampshades the list includes table lamps, bed-lights, ceiling fittings and wall brackets. Because of its character the Knightshades bracket 1865 is exceptionally interesting, and matches the three and four light fittings made in a similar scroll style. Finish is ivory or matt black.

Not only is the "Ventura 80," a new series made by the Merchant Adventurers, Ltd., meeting a large commercial demand from architects for schools, etc., it is also highly suitable for domestic use. It is made from a high temperature grade of urea formaldehyde, capable of withstanding

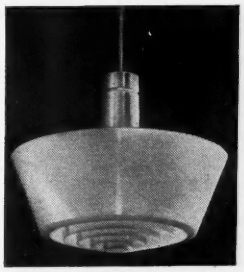
temperatures of 100 deg C, and easy fixing is provided by alternative keyhole slots for 100, 150 and 200 W lamps, into which are slipped the suspension ball chains. The louvred opening gives downward illumination, within a cone of 90 deg, providing a cut-off angle of 45 deg. General shadowless ceiling illumination is provided by the open top.

The new range of G.E.C. lighting fittings meets a growing demand from architects and others for more variety and decoration in the contemporary style.

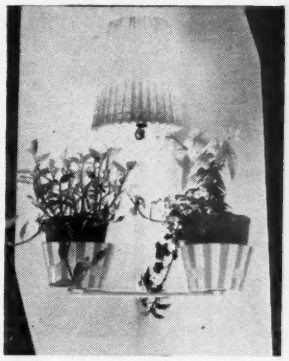
The new designs are ideal for modern settings, in which analogous harmonies of quiet colours are giving way to more stimulating contrasting harmonies. An important feature of the new fittings therefore is the use of strong luminous colours for shades as well as a variety of enamel finishes on metal. In many of the spun aluminium reflectors decorative piercings lighten the appearance of the fittings when illuminated. The new range embraces ceiling fittings, pendants, wall brackets, floor and table standards. The lampshades are made of glass, "Chrysaline," spun aluminium, buckram and card, in shapes which vary from globes and dishes to cones and "diabolos." The predominant colours apart from black and white, are duck-egg-blue, peony, mustard-yellow and cherry-red.

Among Troughton & Young fittings are several neat table lamps including a 30 W striplight fitting with adjustable lemon coloured reflector and white tubular stand (F.907). The F.1031 lamp has an off-white grained plastic shade and satin brass base with black counter-weight. The fitting is suitable for use as a table lamp as well as for wall mounting. Fittings that have particular application for use over wash basins and mirrors are included in the company's "Mondolite" range, the screen on the F.986 and F.988 fittings being reversible to give a greater spread of light. These can also be mounted in a row with the screens overlapping to provide a continuous line.

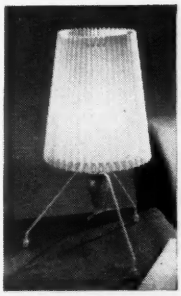
Spun aluminium shades, in a range of eight colours, are employed in several pendant and wall light fittings made by Cone Fittings, Ltd., or, as an alternative, pleated washable acetate shades may be used. Berry's Electric, Ltd., also have several models in the contemporary style the latest of which is a conical shaped ceiling fitting (M.9/9324) measuring 19½in in diameter. Metalwork is in black and white and the glass shade can be obtained in a choice of black, lemon or red colours.

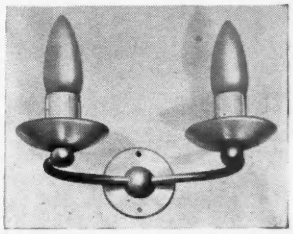


"Ventura 80" lighting fitting (Merchant Adventurers, Ltd.)



Siemens "Oslo" lighting fitting

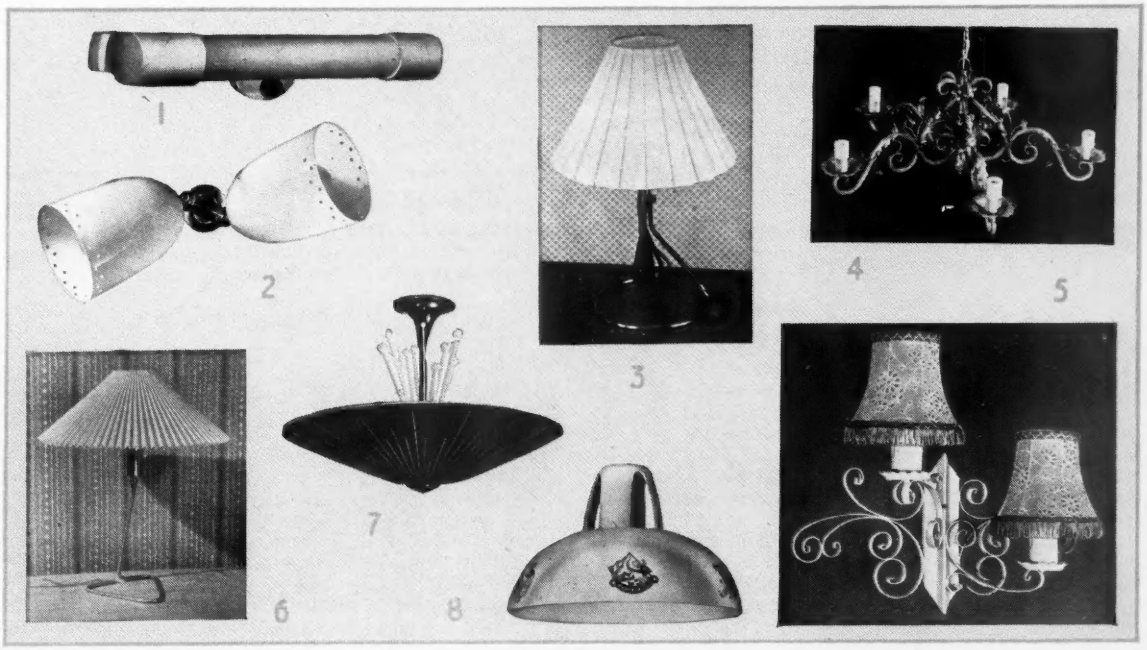




Cone Fittings OPA/568 table lamp and (right) Linolite "C.2." twin lamp wall bracket

Several new contemporary domestic fittings have been introduced by Falk, Stadelmann & Co. The "Oberon" table lamp has a tripod base and adjustable shade. Metalwork is of satin brass and the reflector stoved enamelled fine grain crackle in off-white, cherry red or dove grey. The "Vela" has been designed so that it can be transported from one wall clip to another and when attached to a wall clip it can be adjusted vertically and the reflector may be swivelled

1. *Typical Linealux decorative unit (702).* **2.** *Philament two-light swivel reflectors (991).* **3.** *Troughton & Young F.1031 table lamps.* **4.** *Falcon Forge E22/5 electrolier (Thos. Haywood).* **5.** *Knightshades 1865 two-light wall bracket.* **6.** *Falk Stadelman "Dione" table/wall fitting.* **7.** *Berry's M.9/G324 ceiling fitting.* **8.** *Benjamin Electric nursery "Coolicon" shade*



from side to side. The wall arm and clip are in polished chromium. The "Dione" may be used either as a table lamp or wall bracket and the position of the shade adjusted by means of a knuckle joint.

"Perspex" possesses exceptional light transmission qualities and Wraithe Bros. use this material to advantage in their wide range of lighting units. Being also light in weight they can be hung in a few seconds from any existing lampholder and only an occasional rinse in hot soapy water is needed to maintain their original lustre. Several styles are available in opalescent tints such as champagne, pink, cream and white opal. A novel feature of the "Telelight" is its design. Coloured on one side and white opal on the other, it is designed to stand on the television set with the coloured side to viewers and provides a most decorative means of eliminating eye-strain.

Washable silk lampshades, that are both removable and collapsible, are marketed by G. & S. Wright, Ltd., under the name of "Formashayd." Three successful designs include the "Bell," the "Coolie Hat" and the "Milk Churn." Claimed to cost only half the price of their equivalents in the conventional lampshade, they may be placed on the frame whilst wet for washing purposes and then left to dry.

British made electrical glassware is exclusively used in the range of domestic bowl fittings and shades manufactured by Allsopp & Booth, Ltd., and some of their designs strike an entirely new note.

The demand for the Benjamin plastic "Coolicon" shade is still increasing state the makers and a very large number are now in use in kitchens and bathrooms. In addition there is also the popular "Nursery" version the use for which is obvious. The shade is designed in two kinds of plastic which grip together easily and securely. No screws are required. The gallery will fit any standard shade carrier lampholder and is available in black, white, green or blue.

Whether one prefers soft diffused lighting or a bright concentrated light there are models specially designed to meet all needs in the C.W.S. "Dudley" range, which includes two and three light pendant fittings and many other types. A plastic moulded two light wall fitting, each part of which is reinforced by aluminium tubing, is available in old ivory or gold from G.B.M. All-brass parts are employed for their "Harborne" range which are supplied in five different finishes. Only a few wrought iron lighting fittings are listed, no doubt because many are made up to individual customers' specific requirements.

Another firm which specializes in wrought iron work is Thomas Haywood & Sons, manufacturers of "Falcon Forge" fittings. A particularly fine example of their craft is to be seen in their newly designed E22/5 electrolier. This has a spread of 28in and is finished in black or ivory. At slightly extra cost an armour bright or gold finish is obtainable. It is supplied wired ready for use.

As a county renowned for its extensive forests of oak and birch, towns and villages of Sussex have been chosen as names for many of the carved wood pendants, brackets and floor standards made by Payne & Penny, Ltd., and John Bowen Fittings, Ltd. One particular example is the "Glyndebourne" four arm pendant fitting with a spread of 19in and matching wall brackets.

Tubular lamps can produce simple yet pleasing decorative effects. The Linealux "700" series are modelled in six colours, white, cream, ivory, pearl-grey, pink and eau-de-nil, and are recommended for use with 30 W lamps. Two Linolite introductions likely to prove popular are the "MA" chromium plated fitting available with or without a push button switch and the "MSK" channel strip. This is of pleasing appearance and it is possible to butt them in such a manner as to make a continuous run of light.

MISCELLANEOUS

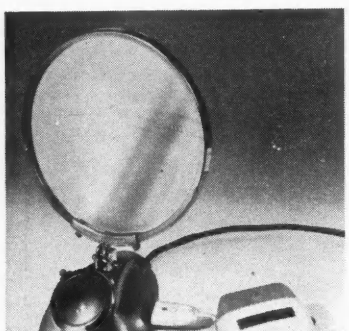
COMING to some of the smaller miscellaneous electrical appliances we may start with the new Chilton electric home hair clipper which needs no talent or experience in its operation. It has a plastic comb attached to its metal teeth and cuts long, top hair with a professional comb-and-scissors action, and, without the comb, shapes and tidies the neck hair. A sliding switch provides finger tip control. The clipper weighs just under a pound; it is well insulated and consumption is 15 W. The standard finish is black but a white de-luxe model is also available.

From electric hair clippers it is a short step to dry shavers, several different types of which are now on the market. One of the latest developments is the Remington "Super 60," a model which favours a more comfortable method of holding, a grip with the palm of the hand rather than the tips of the fingers. Claiming to have the largest effective shaving area of any shaver, it has four rows of surgical steel cutters and a motor speed of 9,500 r.p.m. The Remington "60" is still on the market and its price has been reduced. For the man who can only afford a modest outlay the company offers the "New Contour."

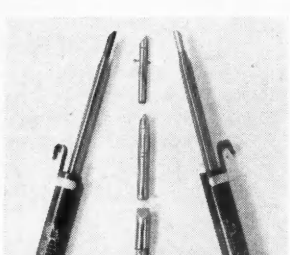
For the convenience of travellers, Philips Electrical produce a battery-operated model. It is a completely self-contained unit with three $1\frac{1}{2}$ V batteries contained in a separate case. A mirror on the top of the case can be held in the hand, hung up, or stood on any flat surface. The shaver incorporates a "Bi-ax" shaving head with rotary action similar to that employed for the mains-operated "Philishave." Special adaptors are required when the shaver is worked off 6 or 12 V car batteries.

Sunbeam Electric's "Shavemaster" has a powerful brush-type, series wound motor, 16-bar armature, and nylon crankshaft drive mechanism, and the company offers a five-year free service guarantee. Dual voltage models are obtainable. From the performance aspect, coupled with low cost, the Arvin "Consort" with its self-sharpening detachable shaving head and self-aligning shears, has much to recommend it. For those who prefer a "luxury" model there is the Arvin "33," a triple-headed shaver with rhomboid cutting shears. A choice of voltages is available, 200/250 and 100/125, and also 12 V for use on a car battery.

Two new models from Switzerland, the "Unic-54" and the round-headed "Unic-Vedette," are now being dis-



Left: Coalport Metalware shaving mirror showing switch and socket



Sunbeam "Shavemaster" W-RA shaver and (left) "Litesold" $\frac{3}{16}$in & $\frac{1}{4}$in bit soldering irons with replaceable bits

1. Remington "Super-60" dry shaver. 2. Arvin "33" dry shaver. 3. "Richard" dual-head shaver (B. H. Ries). 4. Chilton electric hair clipper. 5. Philips "Philishave" mains model dry shaver. 6. "A.B.C." hair dryer (Haynor). 7. Pifco hair dryer hood. 8. Electrothermal "Solis" hair dryer. 9. Bestfrend "Mitey" lightweight dryer. 10. F.H.P. Motors "Sylentflo" hair dryer. 11. Siemens H.632 hair dryer

tributed in this country by Haynor, Ltd. The latter model has a rim round the circular sieve head which acts as a cutting comb, simplifying the task of trimming a moustache.

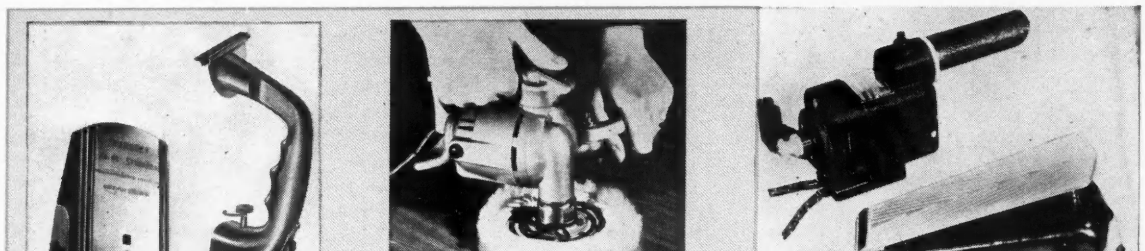
For the traveller Chilton Electrical P.oducts offer a conversion kit, consisting of various sockets and plugs and a transformer, enabling the appliance to be used from any a.c. socket.

There is a saying that "two heads are better than one" and this might well apply to the "Richard" shaver (B. H. Ries, Ltd.) which has two separate heads, one at each end of the body. The shaving head employs a rotary cutter and the clipping head works on a reciprocating principle.

Shaving can be facilitated by the use of an illuminated mirror and the latest product of Coalport Metalware is double-sided, magnifying on one face and plain on the other. It incorporates a push-button switch on one side of the base and on the other a socket to take a dry shaver.

One of the smallest hair dryers on the market is the Bestfrend Electrical Co.'s "Mitey" which measures only 5½in overall and weighs less than 1 lb. It is provided with a zipped, pigskin leatherette wallet, and can be carried in a handbag for holidays or travelling. There are numerous applications in the hairdressing field for the special "Solis 99" wave comb hair dryer made by Electrothermal Engineering who also announce their "Solis 54." Extreme quietness in actual running is a feature of the F.H.P. Motors "Sylentflo" which is fitted with a multi-blade turbine fan.

A model which makes an attractive gift in its presentation casket is the Siemens "H.632" hair dryer. The casket includes a fitted mirror and a comb. Finish is in ivory,



1. Skarsten paint stripper. 2. Electrix "Handyman" sanding, drilling and polishing machine. 3. Parvalux sewing machine motor. 4. "Lee-Lectric" paint scraper (Leedham Products). 5. F. C. Heayberd "Popular" battery charger. 6. Ediswan 5A battery charger, suitable for home use. 7. Carter "Needlelite Junior" sewing machine motor

matching the hair dryer, although an alternative walnut grain moulding is available. A novel addition to the Pifco hair dryer is a hair dryer hood.

The advantages of infra-red or radiant heating for the relief of rheumatism, lumbago, sciatica, fibrositis and similar ailments have long been appreciated and a wide range of this type of equipment is available from the Lumsden Lamp Co. Their products include a wide range of sun lamps of the quartz mercury vapour type and their cabinet model is provided with a convenient compartment in the back to hold the flexible cable and goggles.

In the "Sunfra" infra-red apparatus made by Watson & Sons (Electromedical), Ltd., the emitter, which is fitted into a 10in diameter aluminium reflector, is designed to generate radiation in those wave bands possessing the highest degree of penetration. Both floor and table models are available.

The "Thermasseur" electric home massager (E. Walker & Co.) relieves sufferers by the three-fold action of heat, massage and infra-red rays applied simultaneously. It consists of a mobile, black steel sphere housed in a plastic handle and the standard model is suitable for operation on 230/250 V a.c. through a transformer. An on/off switch and red pilot light are incorporated and the apparatus is easily dismantled for sterilizing purposes. The weight is 6 oz.

Now that the power supply frequency is constant again, the demand for electric clocks is growing and many new designs have made their appearance. The latest Metamec mantel clock has a case manufactured from selected timber and veneers and is fitted with a spun silver plated dial and engraved, polished, brass figures. A feature of the Metamec clocks is that they can be made to tick or be silent at will.

Many new designs and a variety of different cases of metal, glass, plastics, etc., are included in Smith's "Sectric" range, and the company's pictorial clocks have found a successful market amongst those who appreciate art. A typical example is a "Sectric" clock set in a Jacobean oak finished case framing a picturesque scene from the series "The Cries of Old London." Specially packed in a suitable presentation box this particular "picture" measures 10½in high by 8¾in wide.

Three of the latest wood mantel clocks added to the Ferranti range have 5in diameter dials and are fitted with embossed gilt numerals and rich cream hands. The new model 551 alarm clock retains the usual Ferranti feature of 24-hour setting; the buzzer alarm having once been set functions once every 24 hours and when quietened does not require to be reset for the following day. A moulded polystyrene case with maroon, green or cream front is employed and there are luminous spots at the hours with larger luminous markings at 12, 3, 6 and 9 for easy identification in the dark, together with luminous hands.

Besides keeping a car battery in condition and helping to prolong its life, a home battery charger is a facility well worth the few pounds outlay to the motorist, as on a cold winter's morning nothing can be more exasperating than a "flat" battery when starting a car. One of the most recent introductions is the F. C. Heayberd "Popular" 1 A charger, and its low price, under £4, places it within the reach of all. It incorporates full-wave metal rectification and is supplied with an ammeter to indicate the charging rate. Connection is made to the normal mains supply and as the rating is only about 22 W a power point is not necessary. Crypton "home" chargers charge any battery up to 12 V without adjustment from all a.c. mains supplies and also have the advantage of automatic regulation.

A feature of the "Westric" (Westinghouse Brake & Signal Co.) trickle charger which has a nominal output of 2 A, is that the initial charge rate tapers automatically as the battery voltage rises, thus guarding against overcharging. Banner Electric models are available in four sizes ranging from 1 to 4 A, and the "Davenset Junior" (Partridge, Wilson) is suitable for charging the batteries fitted to cars of small and medium horse-power.

The new Easco model "D.20A" has been designed especially to meet the requirements of the owner-driver and is suitable for 12, 6 or 2 V batteries. It weighs only 8 lb and it can be mounted on a wall or bench or simply stood on the floor of the garage. Also of particular interest to the home user is the Ediswan "Tungar" 5 A model, built on the same lines as the company's commercial chargers.

Inspection lamps are almost indispensable in the garage and many makes are on the market. A special unit known as the "Inspectascope," for looking under the car, is available from Manchester Precision Tools. An engine pre-heater is

provided by Bertram Thomas (Engineers), Ltd., a simple robust device in the form of a steel tray which encloses two heating elements. This is slid under the bonnet of the car overnight; it keeps the radiator water and engine oil at normal temperature to prevent damage through freezing and facilitates starting on cold mornings.

There has been a marked trend towards the use of intercommunication equipment domestically, particularly for "baby warning" devices, where the attention of the family is engaged by radio or television. The Easco Electrical "Intertalk" loudspeaking system is simple to install and operate and permits a baby's cries to be heard on the "master station" although the "sub-station" may be anything up to 50ft away.

The domestic applications of electricity are not confined to the house; it can also help the gardener. Soil warming by electrical methods is particularly suited to the needs of the small grower and amateur, since it can be applied very cheaply to a small unit such as a cold frame and obviates the expense of installing and maintaining greenhouse heating. Even in the greenhouse soil warming is very economical. The Warm-Glow soil heater is made specially for the small grower, being designed for the standard cold frame measuring 6ft by 4ft. It consists of a flexible heating element about 0·14in in diameter and measuring 45 to 50ft in length. The whole is coated with a tough plastic material inpervious to acids, water or fertilizers.

Another company which specializes in soil warming equipment is Calidec, Ltd., and their 4 V seed germinator is of interest to all growers. Measuring 30in by 16in space is provided for three standard seed trays and it can also be used as a self-contained greenhouse for starting dahlia tubers, chrysanthemum stools, etc.

Apart from the more usual forms of heating, infra-red and floor heating are being increasingly used by the amateur for both chicken and pig rearing, and we are told by Metway Industries that there is a big demand for their "Broodaway" infra-red chicken brooder units. They are made in two sizes of reflector, with dull emitter (250 W) or bright emitter (400 W).

Although welcomed by refrigerator manufacturers the past hot, dry summer was not exactly ideal growing weather for lawns, and we learn from one of the electric lawnmower makers that there was a marked drop in sales this year. Actually there are, as far as we are aware, no new models on the market, several makes, such as the Webb 12in and 14in models, maintain their popularity. A feature of this company's machines is the eight bladed cutting cylinder and for the 14in model a lawn edge trimming accessory is available. The J. P. Engineering Co. offers the "Maxees" in 12in size, the "Monarch" in 12 and 14in sizes, and the "Super" model in 14 and 16in sizes. The first two employ powered drive cutters only, whereas the "Super" is completely self-propelled. This company announces that it can now offer a conversion unit to give power drive to the "Maxees" and "Monarch" post-war non-electric models. A similar conversion unit, designed to fit most makes of manually operated lawnmowers, is also marketed by Alpha Machine (Tools), Ltd.

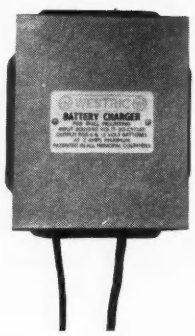
The well-made electric hedge cutter is safe and effortless to use. The "Tarpen" hedge trimmer is fitted with an overload clutch and the Bylock "Senior" rotary model has an ingenious double switch control system that ensures absolute safety in operation.

Among electrical appliances which should help to make the housewife's lot a happier one are sewing machine motors. Not only do they leave the hands free to manipulate the material being sewn, but work is easier and quicker. Carter Electrical Co's "Needlelite" has been specially designed for domestic use and is supplied with either foot or hand control switch and speed regulator. The needle light which is independently switch controlled, is integral with the motor and the lampshade is easily turned to direct the light beam. The Parvalux unit incorporates built-in radio and television suppressors.

For the home handyman, two new accessories to the Wolf "Cub" range have been introduced, a high-speed bench planer and a bench sanding set. The planer is driven by the "Cub" drill and fitted with a specially designed planing head, and the bench sander set enables a fine, accurate finish to be given to wood, metal, plastics, etc.

In their range of home handyman equipment Black & Decker have commenced production of four new attachments for the "Utility" series. These consist of a portable saw table, a lathe saw table stand, a lathe boring attachment

1. Ferranti model 551 alarm clock. 2. Smiths "Woodrose" mantel clock. 3. Metamec mantel clock. 4. "Dee-Gee" electric bottle heater (David Griffin). 5. Lumsden cabinet sun lamp. 6. Chalfont 9in prescription infra-red and radiant heat lamp. 7. Vent-Axia reversible fan. 8. "Intertalk" loudspeaking communication system (Easco Electrical)



Above: J. P. "Super" electric lawnmower. Right: Westinghouse "Westric" battery charger

Webb 12in lawnmower

and a sanding plate, all of which can be operated by either the sander/polisher drill, or the ¼in "Utility" drill.

Outstanding features of the Electrix "Handyman" is its lightness (5½lb), portability and the fact that it can be easily operated with one hand. A secondary handle opens out leverwise to give extra operational control. Standard equipment consists of sander, lambswool polisher and felt pad. The drill chuck has a capacity up to ¼in.

Because of the high cost of household decorating many house owners now tackle exterior painting themselves and much use is being made of the electric paint scraper. A useful feature is that it leaves one hand free all the time and the danger of fire and cracked windows is lessened. The "Lee-Lectric" paint scraper (Leedham Products) has been designed for the home decorator and may be used for both interior and exterior woodwork. By pressing a button underneath the handgrip of the handle of the Skarsten paint stripper/scraper a spring-loaded catch is released allowing the heating unit to be detached. The makers of this particular appliance claim that it can also be successfully used for the removal of wallpaper.

A lightweight soldering instrument, specially suitable for home use is made by Light Soldering Developments, Ltd. The "Litesold" unit is available with bits from ⅛in to ⅜in, and the smallest model weighs, less flex, only ½ oz. Models are supplied in all voltage ranges from 6 V to 230/250 V.

Pipes often burst in the most inaccessible places at the most awkward moments. Now, however, at very low cost, this bogey can be removed as the Warm-Glow Co. has evolved an economical electric pipe heating cable which can be laid along or wrapped around the pipes wherever they may be vulnerable to frost. The same company also announce what they claim to be the world's first air conditioner expressly designed for a piano.

Among other useful electrical appliances we may mention an electric cigarette lighter, a gas lighter (both made by Truvox) and a device for keeping a baby's bottle warm (David Griffin).

In the preceding articles mention has been made from time to time of the use of thermostats and thermostatically controlled appliances. In this connection the Rheostatic Co.'s "Satchwell" Q room thermostat does not merely function as a thermally operated on-off switch. It is different in that it is provided with a small internal accelerating heater which is automatically energized when the instrument is calling for heat. Consequently, during the "on" periods of the thermostat its internal temperature attains the desired value before the heated space and this has the effect of avoiding temperature overshoot as a result of space heater thermal capacity. The effect of the accelerating heater is to cause the thermostat to operate at much more frequent intervals so that heat is supplied to the space in many short impulses. The result is to avoid high or low temperature extremes within the space heater which is consistent with maintaining a steady space temperature coupled with reasonably constant conditions of radiant and convected heat.

We are grateful to Berry's Electric, Ltd., the British Electrical Development Association, the Coventry Radiator & Presswork Co., Ltd., Electrolux, Ltd., and the Simplex Electric Co., Ltd., for the pictures used to introduce the various sections of this article reproduced on page 727.

Domestic Appliances and Their Makers

Full Names and Addresses are given on Page 752

Air Conditioners:—Balmore, Biddle, Brentford, Fenton Byrn, G.E.C., Industrial Humidifiers, Lightfoot, New Estate, Pressed Steel, Temperature, Walter, Weatherhead.

Battery Chargers:—Banner, Crypton, Electric Construction Co., Easco, Edison Swan, G.E.C., Heayberd, I.R.L., Partridge Wilson, Philips, Ray, Runbaken, Standard Telephone, Tarpen, Westinghouse.

Bedwarmers:—Belling, Blanella, Chalfont, Denhams, G.E.C., Hall & Veret, Hope, Isopad, Milliwatt, Thermat, Thermega.

Bells:—British General Mfg. Co., Dulci, Friedland, G.E.C., Gent, Julius Sax, Ward & Goldstone.

Bellpushes, Illuminated:—Friedland, G.E.C., Telsen.

Blankets and Pads:—Bestfrend, Bulpitt, Chalfont, Dowsing, Easipower, Engel, Holt Engineering, Robt. Holt, Hope, Hotpoint, Hurseal, Isopad, Milliwatt, Permaheat, Pifco, Premier, Stanley, Sutcliffe & Clarkson, Telsen, Thermalux, Thermat, Thermega, Thermolectrics, Thermoset, Warmex, Warm-Glow, Wholesale Fittings Co., Windak, Wye Valley Hand Weavers, Yelsen.

Boiling Plates and Rings:—Backer, Belling, Carron, Criterion, Dependable Products, Dexray, Electroway, Engel, Gatehill, G.E.C., Grafton, Grubb, Hotpoint, Jackson, Metropolitan-Vickers, Metway, Price, Reeves, Revo, Telsen, Walls.

Churns, Butter:—Blow, Churn.

Cigarette Lighters:—Truvox.

Clocks:—British and Foreign Agencies, Derby Alabaster, Ferranti, G.E.C., Gent, McKellen (battery), Metamec, Ries, Smiths, T.M.C.-Harwell ("Temco").

Clothes Dryers and Airers:—Belling, Coventry Radiator, English Electric, Chalfont, G.E.C., Hotpoint, Morphy-Richards, Oprim, Walter.

Coffee Mills:—Hillman, Sew-Tric.

Coffee Percolators:—Bescol, Best Products, Bulpitt, Cass, Cona, Davidson, Elga, Falk Stadelmann, G.E.C., Hotpoint, Merlin, Premier, Russell Hobbs, S.L.R., Tomlinson.

Convector Heaters:—Belling, Benham, Berry's Electric, Bescol, Biddle, Bratt Colbran, British National Electrics, E. K. Cole, Crosslands (Rugeley), Dexray, Dorset, Drydenair, Dulrae, Electroway, Falk Stadelmann, Fenton Byrn, Frost, G.E.C., Gillott, Grubb, H.M.V., Heatovent, Heatrae, Hobourn, Hounslow ("Chalex"), Hume Atkins, Hurseal, Lossos, Midland Electric Mfg., Morphy-Richards, Price, Rivlin, Sutcliffe & Clarkson, Tividale, Unity, Weatherhead, Willectric Thermall, Yelsen.

Cookers:—Belling, British National Electrics, Carron, English Electric, Falco, G.E.C., Hawkins, Jackson, Moffats, Parnall, Revo, Simplex ("Creda"), Tricity.

Cookers, Breakfast:—Belling, British National Electrics, Carron, Dexray, G.E.C., Hounslow ("Chalex"), Metway, Parnall, Revo, Telsen, Tricity.

Darners, Illuminated:—Pifco.

Dish Washing Machines:—Ada, Arcason, Balmore, Carefree, Dishmaster, Paul.

Door Chimes:—Friedland, Morphy-Richards, Telsen.

Drying Cabinets:—Ada, Belling, Chalfont, Euk, Fenton Byrn, Fisher, Glover, Heatovent, Hotpoint, Hounslow (" Chalex "), New Estate, Oprim, Bertram Thomas.

Egg Boilers:—Hawkins.

Fans:—Aerex, Airscrew (window), Balmore, Biddle, Carter, E.R.Co., Fenton Byrn, Frost, G.E.C., Hotpoint, Industrial Humidifiers, Keith Blackman, Limit, Revo, Vent-Axia.

Fan Heaters:—Aerex, Balmore, Biddle, E. K. Cole, Collaro, Delaney, Galley, E.R. Co, Fenton Byrn, G.E.C., Gillott, H.M.V., Heatovent, Hurseal, Key Leather, Lossos, Unity.

Feeding Bottle Heaters (Babies):—Churn, Griffin, Santos, Williams.

Fires:—Bank Hardware, Bell, Belling, Berry's Electric, Bratt Colbran, British National Electrics, Bulpitt, Carron, C.W.S., Cradley, Cranmer & Cheshire, Crosslands (Rugeley), Davidson, Dependable Products, Dexray, Dowsing, Dualit, Engel, E.R. Co., Electroway, Engel, Falco, Falk Stadelmann, Ferranti, French, Frost, G.B.M., Gatehill, G.E.C., Grafton, Grubb, H.M.V., Haley, Hawkins, Heatrae, Hotpoint, Hounslow (" Chalex "), Hurseal, Key Leather, I.R.L., Midland Electric Mfg., Monarch, Morley, Pifco, Premier, Price, Reeves, Revo, Scott-Smith, Sperryn, Telsen, Tym's Electric.

Floor Polishers:—Aarden Lewis, Bylock, Columbus-Dixon, Electrix, Electrolux, Fillerys, G.E.C., Hoover, Phœnix, Truvox, Vactric.

Floor Warming Equipment:—Calidec, Panelec.

Food Trolleys:—Blackburn, Doughty, Hawkins, Jackson, Bertram Thomas.

Fountains:—Stokes.

Frying Pans:—Sunbeam.

Gaslighters:—Ever Ready, Truvox.

Greenhouse Heaters:—Berry's Electric, British National Electrics, Calidec, E. K. Cole, Fenton Byrn, G.E.C., Heatovent, Heatrae, Hurseal, Bertram Thomas, Unity, Wardle.

Grillers:—Apsley, Brattel, M.E.A.C., Warner.

Grinders, Kitchen:—Haynor, Hillman, Sew-Tric.

Hair Clippers:—Chilton.

Hair Dryers:—Alexander, Bestfrend, Brown Bros., Bylock, Electrothermal, Falk Stadelmann, Fractional H.P. Motors (" Sylentflo "), Fransen, G.E.C., H.M.V., Hawkins, Haynor, Morphy-Richards, Ormond, Pifco, Siemens, Siroma.

Hand Dryers:—Acru, Bylock, Pyrovac, Quiz.

Heat Pumps:—Brentford, Ferranti.

Heating Panels:—Benham, E. K. Cole, Dulrae, Electrothermal, G.E.C., Heatovent, Isopad, Morphy-Richards, Panelec, Poxon, Unity.

Hedge Trimmers:—Bridges (drill attachment), Bylock, Raylor, Tarpen.

Immersion Heaters:—Aidas (" Sadia "), Backer, Balmore, Belling, Benham, Berry's Electric, Bescol, Best Products, Bestfrend, Blackburn, Geo. Bray, British National Electrics, Campbell, Chalfont, Controlled Heating Units (London), Davidson, Eltron, Falk Stadelmann, Ferranti, Fisher, G.B.M., G.E.C., Gillott, Grubb, Heatrae, Hotpoint, Duncan Low, Merlin, Metropolitan-Vickers, Metway, Morley, George Nobbs, Remploy, Santon, Sarum, Simplex (" Creda "), Sperryn, Telsen.

Insect Killers:—Aerovap, Vulcan.

Ironers:—Ada, Fisher, G.E.C., Hotpoint, Industrial Machinery & Appliance Co., Oprim, Parnall, Wilkins & Mitchell.

Irons, Automatic:—Ada, Bank Hardware, Bylock, Cass, C.W.S., Easipower, Falk Stadelmann, G.E.C., Grafton, H.M.V., Hawkins, Homefyre, Hotpoint, I.R.L., Jelson, Metway, Morphy-Richards, Pifco, Premier, Price, Revo, Robson, Scottish Precision Engg., Telsen, Thorn, Tym's Electric.

Irons, Non-Automatic:—Bank Hardware, Carron, Cass, C.W.S., Criterion, Dowsing, E.R. Co., Falk Stadelmann, G.E.C., Grafton, Homefyre, I.R.L., Kenrick, Metway, Premier, Price, Robson, Scottish Precision Engg., Selex, Telsen, Tym's Electric, Westerman, Wholesale Fittings.

Irons, Cordless:—Donaldson, Dowsing, Walter.

Irons, Steam or Dry:—Hoover, Kenwood, Morphy-Richards.

Irons, Travelling:—A.B. Metal Products, Bank Hardware, Criterion, Elga, Falk Stadelmann, G.E.C., Grafton, Lucas Holder, Mayer (London), Metway, Morphy-Richards, Price, Robson, Sims, Telsen.

Juice Extractors:—Barclay (" Paladin "), Kenwood.

Kettles:—Bescol, Best Products, Bulpitt, Buncher & Haseler, Campbell, Cass, Chalfont, C.W.S., Davidson, Dependable Products, Doughty, Easipower, Elga, Eltron (combined tea kettle), Falk Stadelmann, G.E.C., Grafton, Hawkins, Hotpoint, Merlin, Metway, Pearl, Premier, Russell Hobbs, Telsen, Tomlinson.

Kettles, Whistling:—Bescol, Best Products, Bestfrend, Bulpitt.

Lawnmowers:—A.M.I. (" Ladybird "), Alpha (attachment), J.P., Nutt (" Hayn "), Shanks, Webb.

Lighting Fittings:—Allom, Allsopp & Booth, Ascog, Benjamin, Berry's, Best & Lloyd, Bristol, Cone Fittings, C.W.S., Cranmer & Cheshire, Crosslands (Rugeley), Derby Alabaster, Dernier & Hamlyn, Dexray, Doughty, Downer, Edison Swan, Ekco-Ensign, Electric Art Shade, Ever Ready, Falcon Forge, Falk Stadelmann, Finmar, Forrest, Froylectric, G.B.M., G.E.C., Oswald Hollman, Homeshade, Hume Atkins, Kego, Kirolite, Knightshades, Linealux, Linolite, Loblite, Longford Electric, McGeoch, Martin, Merchant Adventurers, Merlin, Metropolitan-Vickers, Metway, Morley, New Estate, Osborn (" Cobra "), Osler & Faraday, Philament, Philips, Quinnell, Rowlands, Scott-Smith, Siemens, Herman Smith Smithlite, Speights, Straight-Lite Reflectors, Telsen, Fredk. Thomas, Thorn, Troughton & Young, Ward & Goldstone, Wardle, Webb's Crystal Glass, Wholesale Fittings, Wraithe.

Massagers:—Braun, Fattelay & Sharp, Haynor, London Commercial Electric Stores, Pifco, Walker.

Mattresses, Heated:—Slumberland, Thermalux.

Medical Lamps:—Arora, Barber, Chalfont, Hanovia, Hope, London Commercial Electrical Stores, Lumsden, Perihel, Pifco, Raysol, Walker, Watson.

Mixers, Food and Drink:—Barclay, Braun, Brown Bros., English Electric, Falk Stadelmann, Howard Foss, General Woodworkers, H.M.V., Hawkins, Haynor, Kenwood, Midland Repetition, Siroma, Valmade.

Ozonizers:—E.C.D., Ozonair, Walter.

Paint Strippers:—Baronet, Cheshire, Leedham, Osborn, Skarsten.

Plate Warmers:—Belling, Bratt Colbran, Electrothermal, English Electric, G.E.C., Heatrae, Hotpoint, Premier, Telsen, Bertram Thomas, Tricity.

Radiators, Water and Oil Filled:—Benham, Dimplex, Drydenair, G.B.M., Grubb, Hobourn, Hurseal, Duncan Low, Remploy, Santon, Steel Radiators.

Radio Sets:—Ace, Balcombe, Beethoven, E. K. Cole, Cossor, Dulci, Ever Ready, Ferranti, G.E.C., Invicta, Kolster-Brandes, McMichael, Masteradio, Merlin, Murphy, Philips, Pye, R.M. Electric, Raymond-Electric, Thorn, Vidor.

Refrigerators:—Alaska, Astral, Balcombe, Balmore, Coldrator, Easiclene, Electrolux, English Electric, Frigidaire, G.E.C., General Woodworkers, Hotpoint, L.E.C. Refrigeration, Lightfoot, Morphy-Richards, Nash-Kelvinator, Pressed Steel (" Prestcold "), Wilkins & Mitchell (" Servis ").

Refuse Disposal Units, Sink:—Balmore, Dishmaster.

Sewing Machine Motors:—Carter, Howard Foss, G.E.C., Hillman, London Commercial Electrical Stores, Parvalux, Sew-Tric.

Shavers:—Arvin, Braun, Chilton, Fransen, Haynor, Philips, Pifco, Remington, Ries, Rolls, Ronson, Sunbeam.

Shaving Mirrors, Illuminated:—Coalport, Pifco.

Soil-Heating Equipment:—Banner, Calidec, Chalfont, Electrothermal, G.E.C., Unity, Warm-Glow.

Soldering Irons:—Acru, Adcola, Browning's Electric, Casey, G.E.C., Light Soldering Developments, Metal & Electro Chemicals, Metropolitan-Vickers, Rawlplug, Remploy, Runbaken, Standard Telephones, Telsen, Wolf.

Spits, Roasting:—Infra-Heat, Warner.

Sprayers:—Burgess, Bylock, Columbus-Dixon.

Tea-Making Sets:—British Vacuum Cleaner & Engg. Co. (" Goblin "), Filtrite, Hawkins, Pifco, Pye, Teesmade.

Television Sets:—Balcombe, Beethoven, E. K. Cole, C.W.S., Cossor, English Electric, Ferranti, G.E.C., Invicta, Kolster-Brandes, McMichael, Masteradio, Murphy, Philips, Pye, R.M. Electric, Rainbow, Raymond-Electric, Thorn.

Toasters, Automatic:—Dualit, Elga, Falk Stadelmann, G.E.C., Morphy-Richards, Pifco.

Toasters, Non-Automatic:—A.B. Metal Products, Appliances & Machinery (Industrial), Bank Hardware, Bulpitt, Davidson, Dualit, Easipower, G.E.C., Grafton, Hawkins, Homefyre, Hotpoint, I.R.L., Ormond, Premier, Price, Pye, Reeves, Telsen.

Tools, Portable:—Black & Decker, Bridges, Electrix, G.E.C., Rawlplug, Tarpen, Wolf.

Towel Dryers, Roller:—Bromwest,

Towel Rails:—Belling, Benham, Drydenair, Dulrae, Froylectric, G.B.M., Heatrae, Lan-Bar.

Trouser Creasers:—Falk Stadelmann, Lighters, Pifco.

Tubular Heaters:—Bescol, British National Electrics, Calidec, E. K. Cole, Electroway, Falk Stadelmann, G.E.C., Grubb, Heatovent, Heatrae, Hurseal, Metropolitan-Vickers, Bertram Thomas, Unity, Wardle, Weatherhead.

Utensils, Ground Base:—Bulpitt, Buncher & Haseler, Corfield-Sigg, Dependable Products, Easipower, Hague & McKenzie, White Bros. & Jacobs.

Vacuum Cleaners, Canister:—British Vacuum Cleaner & Engg. Co. (" Goblin "), Bylock, Tellus.

Vacuum Cleaners, Cylinder:—British Vacuum Cleaner & Engg. Co. (" Goblin "), Brown Bros., Bylock, Cadisch, C.W.S., Crown, Electrix, Electrolux, Express, Fillerys, G.E.C., Hoover, Phœnix, Siroma, Taylor, Vactric.

Vacuum Cleaners, Hand:—British Vacuum Cleaner & Engg. Co. (" Goblin "), Brown Bros., Bylock, Cadisch, C.W.S., Falk Stadelmann, Hoover, Siroma, Taylor, Water Softener & Vacuum Cleaner Service (" Jifextra "), Wholesale Fittings Co.

Vacuum Cleaners, Upright:—British Vacuum Cleaner & Engg. Co. (" Goblin "), Brown Bros., Columbus-Dixon, C.W.S., Fillerys, G.E.C., Hoover, Hotpoint, Nash, Siroma, Taylor, Vactric, Vacuums.

Waffle Irons:—Dualit, S.L.R.

Washboilers:—Alder, Amplec, Brailsford, Bulpitt, Burco, Chalfont, Dugdale, G.E.C., Hawkins, Jackson, Lamb Hingley, Monarch, Simister, Herman Smith Smithlite, South Wales Switchgear, Tomlinson, Universal Boilers.

Washing Machines:—Ada, Balmore, Bendix, British Vacuum Cleaner & Engg. Co. (" Goblin "), Burco, Carefree, Clegg & Coupe, C.W.S., Cotto, Easiclene, English Electric, Entwistle & Kenyon, Fisher, G.E.C., Hoover, Hotpoint, Lamb Hingley, Longford Electric, Parnall, Paul, Senior, Universal Boilers, Wilkins & Mitchell, Wonder.

Water Heaters, Instantaneous:—Balmore, Campbell, Eltron, Ferranti, G.E.C., Teesmade.

Water Heaters, Storage:—Aidas (" Sadia "), Berry's Electric, Brentford, British National Electrics, Eltron, Ferranti, Fisher, G.E.C., Heatrae, Hotpoint, Duncan Low, Metropolitan-Vickers, Santon, Simplex ("Creda"), W. H. Smith (" Eziot ").

Wringing Machines:—Acme.

DOMESTIC APPLIANCE MANUFACTURERS

Names and Addresses of Firms Referred to in this Issue

Aarden, Lewis, Ltd., 52, Valley Road, Streatham, London, S.W.16.
A.B. Metal Products, Ltd., Ynysboeth, Abercynon, Glam.
A.M.I. Ladybird, Emmbrook Mill, Wokingham.
Ace Radio, Ltd., Tower Road, Willesden, London, N.W.10.
Acme Wringers, Ltd., David Street, Bridgeton, Glasgow.
Acru Electric Tool Mnfg. Co., Ltd., Chapel Street, Levenshulme, Manchester, 19.
Ada (Halifax), Ltd., Johnson Street, Halifax.
Adcola Products, Ltd., Gauden Road, Clapham High Street, London, S.W.4.
Aerex, Ltd., 6-7, New Bridge Street, London, E.C.4.
Aerovap Holdings, Ltd., 23, Old Bond Street, London, W.1.
Aidas Electric, Ltd., Sadia Works, Rowdell Road, Northolt, Greenford, Middlesex.
Airscrew Co. & Jicwood, Ltd., Weybridge.
Alaska Mfg. Co., Ltd., 75, Clarendon Road, Watford, Herts.
Alder Electrical Appliances, Ltd., Rushworth Street, Burnley, Lancs.
Alexander, Charles, & Co., Ltd., 74, Portsmouth Road, Surbiton, Surrey.
Allom Bros., Ltd., Lombard Road, London, S.W.16.
Allsopp & Booth, Ltd., Dudley Port, Tipton.
Alpha Machine (Tools), Ltd., Southend Arterial Road, Gidea Park, Essex.
Amplec, Ltd., Grange Works, Grange Lane, Accrington.
Appliances & Machinery (Industrial), Ltd., 11, King Street, Wolverhampton.
Apsley Metal Products, 12, Shirland Mews, London, W.9.
Arcason Products, Ltd., 34, Upper Brook Street, London, W.1.
Arvin Electric Co., Ltd., Fernbrook Avenue, Southend-on-Sea, Essex.
Ascog, Ltd., 44, Theobalds Road, London, W.C.1.
Astral Equipment, Ltd., 96, Buchanan Street, Glasgow, C.1.

Backer Electric Co., Ltd., Fitzwilliam Road, Rotherham.
Balcombe, A. J., Ltd., 52-58, Tabernacle Street, London, E.C.2.
Balmore Electrics, Ltd., 13a, Old Burlington Street, London, W.1.
Bank Hardware Manufacturing Co., Ltd., Pleck Road, Walsall.
Banner Electric Co., Ltd., Burford House, Hoddesdon.
Baronet Electrical Developments, 159, Alston Street, Ladywood, Birmingham, 16.
Barber Electrical Services, Leach Street, Birmingham, 16.
Barclay & Sons, Ltd., Paladin Division, 28, Old Brompton Road, London, S.W.7.
Beethoven Electric Equipment, Ltd., 89-95, Reddish Lane, Gorton, Manchester, 4.
Bell, A., & Co., Ltd., 1a and 3, Gold Street, Northampton.
Belling & Co., Ltd., Bridge Works, Southbury Road, Enfield.
Bendix Home Appliances, Ltd., Albion Works, Kingsbury Road, Birmingham, 24.
Benham & Sons, Ltd., 66, Wigmore Street, London, W.1.
Benjamin Electric, Ltd., Brantwood Works, Tariff Road, London, N.17.
Berry's Electric, Ltd., Touchbutton House, Newman Street, London, W.1.
Bescol (Electric), Ltd., 118, Parkfield Road, Saltley, Birmingham, 8.
Best & Lloyd, Ltd., Wattville Road, Birmingham, 21.
Best Products, Ltd., Felix Works, Felixstowe.
Bestfrend Electrical Co., Ltd., Diceland Works, Banstead.
Biddle, F. H., Ltd., 52, Clerkenwell Close, London, E.C.1.
Black & Decker, Ltd., Harmondsworth, Middlesex.
Blackburn, C. H., & Co., Ltd., 10, Gray's Inn Road, London, W.C.1.
Blanella, Ltd., Boston Spa, Yorkshire.
Blow, J. J., Ltd., Oldfield Works, Chesterfield.
Bowen, John, Fittings, Ltd., 556-586, Kings Road, Chelsea, S.W.
Brailsford Bros., Queens Road, Barnsley.
Bratt, Colbran, Ltd., Lancelot Road, Wembley, Middlesex.
Brattel Electric Co., Ltd., Dorchester-on-Thames, Oxon.
Braun (Bletchley) Electronics, Ltd., Balham Road, London, N.9.
Bray, Geo., & Co., Ltd., Leicester Place, Leeds, 2.
Brentford Electric, Ltd., Kidbrooke Park Road, Kidbrooke, London, S.E.3.
Bridges, S. N., & Co., Ltd., Parsons Green Lane, London, S.W.6.
Bristol, Chas. F., & Son, Ltd., 17-19, Lench Street, Birmingham, 4.
British & Foreign Agencies, Ltd., 37, Colvend Street, Glasgow, S.E.
British General Mnfg. Co. (1941), Ltd., 38, Glasshill Street, London, S.E.1.
British National Electrics, Ltd., Newarthill, Motherwell, Lanarkshire.
British Vacuum Cleaner & Engg. Co., Ltd., Goblin Works, Leatherhead.
Bromwest, Ltd., 159, Notting Hill Gate, London, W.11.
Brown Bros., Ltd., Great Eastern Street, London, E.C.2.
Browning's Electric Co., Ltd., Boleyn Castle, Green Street, Upton Park, London, E.13.
Bulpitt & Sons, Ltd., Icknield Street, Birmingham, 18.
Buncher & Haseler, Ltd., Branston Street, Birmingham, 18.
Burco, Ltd., Waterside Mill, Rose Grove, Burnley.
Burgess Products Co., Ltd., Hinckley, Leicester.
Bylock Electric, Ltd., 109, South Street, Enfield, Middx.

Cadisch, R., & Sons, Red Lion Square, London, W.C.
Calidec, Ltd., 12-15, Lupin Street, Birmingham, 7.
Campbell Engineering Co., Ltd., Bromley, Kent.
Carefree Domestic Appliances, Ltd., 44-48, Adeline Street, Manchester, 4.
Carron Company, Carron, Falkirk.
Carter Electrical Co., Ltd., Eastern Works, Eastern Avenue, Romford.
Casey, C. I. (London), Ltd., 49, St. James's Street, London, S.W.1.
Cass Electronics, Ltd., Guildford Street, Chertsey, Surrey.
Chalfont Electrical Products, Ltd., Tyrrell Street, Leicester.
Cheshire, Maurice, & Co., 215, Moseley Street, Birmingham, 5.
Chilton Electric Products, Ltd., Hungerford, Berks.
Churn Co., Station Road, Hailsham.
Clegg & Coupe, Ltd., Molesworth Street, Rochdale.
Coalport Metalware, Ltd., Coalport, Ironbridge, Shropshire.
Coldrator, Ltd., Fletton, Peterborough.
Cole, E. K., Ltd., Ekco Works, Southend-on-Sea.
Collaro, Ltd., By-Pass Road, Barking.
Columbus-Dixon, Ltd., Capitol Works, Empire Way, Wembley, Middlesex.
Cona Coffee Machine Co., Feldon Works, Railway Place, Wimbledon, London, S.W.19.
Cone Fittings, Ltd., 9, Rosemont Road, London, N.W.3.
Controlled Heating Units (London), Ltd., Avenue Road, Hampton, Middlesex.
Co-operative Wholesale Society, National Works, Hall Street, Dudley, Worcs.
Corfield-Sieg, Ltd., Trafalgar Works, Merton Abbey, London, S.W.19.
Cossor, A. C., Ltd., Cossor House, Highbury Grove, London, N.5.
Cotto Products, Enterprise Works, Scunthorpe.
Coventry Radiator & Presswork Co., Ltd., Canley Works, Coventry.
Cradley Foundry & Engineering Co., New Road, Cradley, Staffs.
Cranmer & Cheshire, Ltd., 7-9, Steward Street, Birmingham, 18.
Criterion Electric, Ltd., Abbey Estate, Mount Pleasant, Alperton.
Crosslands (Rugeley), Ltd., 55, Ebury Street, London, S.W.1.
Crown Appliances, Ltd., 18, Gipsy Hill, London, S.E.19.
Crypton Equipment, Ltd., Bridgwater.

Davidson, A. D., Electric Co., 62, Granville Street, Birmingham, 1.
Delaney Gallay, Ltd., Vulcan Works, Edgware Road, Cricklewood, London, N.W.2.
Denhams (Norwich), Ltd., St. George's Works, All Saints Rd., Acton, London, W.3.
Dependable Products, Ltd., Queensway, Team Valley Trading Estate, Gateshead-on-Tyne.
Derby Alabaster (Art Products) Co., 40, Crosby Street, Derby.
Dernier & Hamlyn, Ltd., 23, Newman Street, London, W. 1.
Dexray Engineering Co., Ltd., 34, Ardwick Green South, Manchester, 13.
Dimplex, Ltd., Totton, Southampton.
Dishmaster (London), Ltd., 151, Great Portland Street, London, W.1.
Donaldson Wireless Electric Irons, 31, Sloane Street, Leith, Edinburgh, 6.
Dorset Light Industries, Ltd., 88, East Street, Bridport, Dorset.
Doughty, J. M., & Sons, Ltd., 214-222, St. John Street, London, E.C.1.
Downer, G. V., 29b, Torrington Square, London, W.C.1.
Dowsing Co. (Electrical Manufacturers), Ltd., Kangley Bridge Road, Lower Sydenham, London, S.E.26.
Drydenair, Ltd., Grimshaw Street, Preston.
Dualit, Ltd., 27a, Picton Street, Camberwell, London, S.E.5.
Dugdale Mfg. Co., Craven Sheet Metal Works, Settle, Yorks.
Dulci Co., Ltd., 97, Villiers Road, London, N.W.2.
Dulrae, Ltd., Griffin Lane, Aylesbury.

E.C.D., Ltd., Priory Mill, Tonbridge.
E.R. Company, Elliott Works, Elliott Road, Bromley, Kent.
Easco Electrical, Ltd., 6-8, Brighton Terrace, London, S.W.9.
Easiclene Porcelain Enamel (1938), Ltd., Darlaston, South Staffs.
Easipower, Ltd., 213-215, Gloucester Place, London, N.W.1.
Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.
Ekco-Ensign Electric, Ltd., 45, Essex Street, London, W.C.2.
Electric Art Shade (1928), Ltd., Feering Factory, Kelvedon, Essex.
Electric Construction Co., Ltd., Bushbury, Wolverhampton.
Electrix, Ltd., Sterling Works, Dagenham.
Electrolux, Ltd., 153-155, Regent Street, London, W.1.
Electrothermal Engineering, Ltd., 270, Neville Road, London, E.7.
Electroway Heaters, Ltd., Sparrow Hill, Loughborough.
Elga Products, Ltd., Railway Place, London, S.W.19.
Eltron (London), Ltd., Accrington Works, Strathmore Road, Croydon, Surrey.
Engel, S. I., 23-25, Kensington Park Road, London, W.11.
English Electric Co., Ltd., Queens House, Kingsway, London, W.C.2.
Entwisle & Kenyon, Ltd., Accrington.

Euk Catering Machinery, Ltd., Wellington Street, Oldham.
Ever Ready Co. (Great Britain), Ltd., Hercules Place, London, N.7.
Express Vacuum Cleaner Co., 96, Bath Street, Birmingham, 4.

Falco Electrical Appliances, Ltd., Corporation Road, Audenshaw, Manchester.
Falcon Forge (Proprs.: Thomas Haywood & Sons), Coulsdon, Surrey.
Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, London, E.C.1.
Fattelay & Sharp, Ltd., 10a, Acton Street, Gray's Inn Road, London, W.C.1.
Fenton Byrn & Co., Ltd., Airflow Works, 21, Berrylands Road, Surbiton.
Ferranti, Ltd., Hollinwood, Lancs.
Fillerys (Gt. Britain), Ltd., 101-109, Ladbroke Grove, London, W.11.
Filtrite, Ltd., 91-97, London Road, Manchester, 1.
Finmar, Ltd., 14, Holbein Place, London, S.W.1.
Fisher, H., (Oldham), Ltd., Pennant Street, Oldham.
Forrest, George, & Son, Ltd., 38, Osborne Road, London, W.3.
Foss, Howard, Ltd., Belvidere Works, Totton, Hants.
Fractional H.P. Motors, Ltd., Rookery Way, The Hyde, London, N.W.9.
Fransen, John A., Ltd., Northwood Hills, Middlesex.
French, W. T., & Son, Ltd., Browning Street, Birmingham, 16.
Friedland, V. & E., Ltd., Lower Heys Mills, Macclesfield, Cheshire.
Frigidaire, Division of General Motors, Ltd., Stag Lane, Kingsbury, London, N.W.9.
Frost, H., & Co., Ltd., Fieldgate, Walsall, Staffs.
Froylectric, Ltd., Leamore Street, Hammersmith, London, W.6.

G.B.M. (Electrical), Birmingham, Ltd., 439, Moseley Road, Birmingham, 12.
Gatehill Manufacturing Co., Ltd., Crown Works, Crown Yard, Stanhope Street, London, N.W.1.
General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.
General Woodworkers, Ltd., St. John's Works, Penn, Bucks.
Gent & Co., Ltd., Faraday Works, Leicester.
Gillott Electro-Steam Cookers, Ltd., Cotswold Works, Chalford, Near Stroud, Glos.
Glover, J., & Sons, Ltd., 39-49, Groton Road, London, S.W.18.
Grafton Heater Co., Ltd., 13-15, Westland Place, London, N.1.
Griffin, David, Ltd., 39, Wimborne Road, Poole.
Grubb Engineering Co., Ltd., Mary Street, Birmingham, 12.

H.M.V. Household Appliances, Ltd., Hayes, Middlesex.
Hague & McKenzie, Ltd., Pyramid Works, Sloane Street, Birmingham, 1.
Haley, D., Longmoor Close, Liverpool, 9.
Hall & Veret, Ltd., 434, Rochester Way, Sidcup, Kent.
Hanovia Lamps Division, Englehard Industries, Ltd., Slough, Bucks.
Hawkins, L. G., & Co., Ltd., 30-35, Drury Lane, London, W.C.2.
Haynor, Ltd., 167, Greyhound Road, London, W.6.
Haywood, Thomas, & Sons (Falcon Forge), Coulsdon, Surrey.
Heatovent Electric, Ltd., Lomond Street, Possilpark, Glasgow, N.
Heatrae, Ltd., Heatrae Works, Norwich.
Heayberd, F. C., & Co., Ltd., Greenwich South Street, London, S.E.10.
Hillman Electric Motors, Ltd., 2-3, Northwold Buildings, Northwold Road, London, N.16.
Hobourn Domestic Appliances, Ltd., Temple Farm Works, Strood, Rochester, Kent.
Hollman, Oswald, 208, Kent House Road, Beckenham.
Holt Engg. & Mfg. Co., Ltd., Hemco Works, 210, Stockport Road, Manchester, 13.
Holt, Robert (Middx.), Ltd., Florence Road, Edmonton, N.18.
Homefyre, Limited, 66-72, Brewery Road, London, N.7.
Homeshade Co., Ltd., 99, Baker Street, London, W.1.
Hoover, Limited, Perivale, Greenford, Middx.
Hope, David, & Co., Ltd., Nugent Street, Leicester.
Hotpoint Electric Appliance Co., Ltd., Peterborough.
Hounslow, C., & Co., Ltd., Chalex Works, Southwick, Sussex.
Hume, Atkins & Co., Ltd., New Icknield Way, Letchworth.
Hurseal, Ltd., 229, Regent Street, London, W.1.

I.R.L. Products, Ltd., No. 5 Factory, Upper Bristol Road, Bath.
Industrial Humidifiers, Ltd., Groveley Road, Christchurch, Hants.
Infra-Heat Co., Ltd., 22, Clifton Road, London, W.9.
Invicta Radio, Ltd., Parkhurst Road, London, N.7.
Isopad, Ltd., 30-32, Rosemont Road, London, N.W.3.

J.P. Engineering Co., Ltd., Meynell Road, Leicester.
Jackson Electric Stove Co., Ltd., 143, Sloane Street, London, S.W.1.
Jelson Electric, Ltd., Spring Road, Tyseley, Birmingham, 11.

Kego Electric Co., Ltd., Mount Pleasant, Wembley.
Keith Blackman, Ltd., Mill Mead Road, London, N.17.
Kenrick, Archibald, & Sons, Ltd., Kenrick House, Newman Street, London, W.1.
Kenwood Electrics, Ltd., 26, North Audley Street, London, W.1.
Key Leather Co., Ltd., 5, Urswick Road, London, E.9.
Kirolite Products, Ltd., 107, Southwick Road, Boscombe East, Bournemouth.
Knightshades, Ltd., Derby Road Works, Montague Road, London, N.18.
Kolster-Brandes, Ltd., Foots Cray, Sidcup, Kent.

L.P. Patents, Ltd., Paladin House, Bassett Avenue, Southampton.
Lamb, Hingley & Co., Ltd., Lye, Stourbridge, Worcs.
Lan-Bar, Ltd., Seymour St., Birmingham, 12.
Lec Refrigeration, Ltd., Shripney Works, Bognor Regis, Sussex.
Leedham Products, Ltd., 29, Soho Hill, Birmingham, 29.
Light Soldering Developments, Ltd., 106, George Street, Croydon.
Lighters, Ltd., Pioneer House, Inverness Road, Hounslow, Middlesex.
Lightfoot Refrigeration Co., Ltd., Abbeydale Road, North Circular Road, Wembley.
Limit Engineering Co., Ltd., 15-29, Windsor Street, London, N.1.
Linealux, Ltd., 142, Liverpool Road, London, N.1.
Linolite, Ltd., 118, Baker Street, London, W.1.
Loblite, Ltd., Third Avenue, Team Valley Trading Estate, Gateshead-on-Tyne.
London Commercial Electrical Stores, Ltd., 20-22, Cursitor Street, Chancery Lane, London, E.C.4.
Longford Electric Co., 6, Grosvenor Street, Manchester, 1.
Lossos, M. & J., & Co., Ltd., 31, Beethoven Street, London, W.10.
Low, Duncan, Ltd., 299, Bell Street, Glasgow, C.4.
Lucas Holder, Ltd., 35, Allesley Old Road, Coventry.
Lumsden Lamp Co., Milburn, Almondbank, Perth.

M.E.A.C., Ltd., 1, Chesterfield Street, London, W.1.
McGeoch. Wm., & Co., Ltd., 46, Coventry Road, Birmingham.
McKellen Productions, Ltd., Birmingham Road, Bromsgrove, Worcester.
McMichael Radio, Ltd., 190, Strand, London, W.C.2.
Magnetic Equipment Co., Ltd., Lake Works, Wicor, Portchester.
Manchester Precision Tools, 91-97, London Road, Manchester, 1.
Martin Agency, 43, London Road, Kingston-on-Thames, Surrey.
Masteradio, Ltd., 10-20, Fitzroy Place, London, N.W.1.
Mayer, L. S. (London), Ltd., 18-26, Essex Road, London, N.1.
Merchant Adventurers, Ltd., 43, Portland Road, London, W.11.
Merlin Mouldings, Ltd., 3, Central Parade, London, S.E.6.
Metal & Electro Chemicals, Ltd., Alliance House, Caxton Street, London, S.W.1.
Metamec, Ltd., South Green, Dereham, Norfolk.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, 17.
Metway Electrical Industries, Ltd., Metway Works, Canning Street, Brighton, 7.
Midland Electric Mfg. Co., Ltd., M.E.M. Works, Reddings Lane, Birmingham, 11.
Midland Repetition & Auto Mfg. Co., Ltd., Bayton Road, Exhall, Coventry.
Milliwatt, Ltd., 44, Princess Road, London, N.W.1.
Moffats (Overseas), Ltd., 1, Newman Street, London, W.1.
Monarch Electric, Ltd., Vicarage Road, Lye, Worcs.
Morley, T. B., & Co., Ltd., Jameson Street, Hull.
Morphy-Richards, Ltd., 6, Conduit Street, London, W.1.
Murphy Radio, Ltd., Welwyn Garden City, Herts.

Nash Electrical Co., Ltd., 82, Snow Hill, Birmingham, 4.
Nash-Kelvinator, Ltd., 53-55, New Bond Street, London, W.1.
New Estate Electrical, Ltd., 16-17, Brunswick Street, Leeds, 2.
Nobbs (George) (1935), Ltd., 87-89, Cleveland Street, London, W.1.
Nutt Engineering Co., Ltd., Norwich Street, Cambridge.

Oprim Sales, Ltd., Park Way, Edgware.
Ormond Eng. Co., Ltd., Ormond House, Rosebery Avenue, London, E.C.1.
Osborn Manufacturing Co., Ltd., 5-13, Highgate Square, Birmingham, 12.
Osler & Faraday, Ltd., 89-91, Newman Street, London, W.1.
Ozonair Engineering Co., Ltd., The Esplanade, Rochester.

Panelec (Gt. Britain), Ltd., 27, Hatchlands Road, Redhill, Surrey.
Parnall (Yate), Ltd., 255, North Circular Road, London, N.W.10.
Partridge, Wilson & Co., Ltd., Davenset Electrical Works, Evington Valley Road, Leicester.
Parvalux, Ltd., Broom Road, Parkstone, Dorset.
Paul, W. H., Ltd., Longmore Lane, Breaston, Derby.
Payne & Penny, Ltd., 556-558, Kings Road, Chelsea, S.W.
Pearl Industries, Ltd., Birmingham Factory Centre, Kings Norton, Birmingham.
Perihel, Ltd., West Mall Works, Rabbit Row, London, W.8.
Permaheat, Ltd., Spectator Street, Manchester, 4.
Philament Electric, Ltd., Trading Estate, Bridgend.
Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.
Phœnix Sales, Ltd., Winton House, St. Andrew Street, London, E.C.4.
Pifco, Ltd., Pifco House, Watling Street, Manchester, 4.
Poxon, H. G., Engineering Co., 1, Northolt Road, Harrow.
Premier Electric Heaters, Ltd., Keeley Street, Birmingham, 9.
Pressed Steel Co., Ltd., Cowley, Oxford.
Price, T., & Son (Stampers), Ltd., Spring Hill Passage, Spring Hill, Birmingham.
Pye, Ltd., Radio Works, Cambridge.
Pyrovac, Ltd., 1, Queen's Terrace, Aberdeen.

Quinnell, R. H., & Co., Rowhurst Forge, Oxshott Road, Leatherhead.
Quiz Electrics, Ltd., 160, High Street, Teddington.

R.M. Electric, Ltd., Kingsway, Team Valley, Gateshead.
Rainbow Radio Mnfg. Co., Ltd., Mincing Lane, Blackburn.
Rawlplug Co., Ltd., Rawlplug House, Cromwell Road, London, S.W.7.
Ray Engineering Co., Ltd., Waterdale Works, Southmead, Bristol.
Raylor Bros., Ltd., 59, Beavers Lane, Hounslow.
Raymond-Electric, Ltd., Brent Crescent, North Circular Road, London, N.W.10.
Raysol Electrical Co., 550, Holloway Road, London, N.7.
Reeves Electrical & Radio Co., Ltd., Reelek Works, Baldock.
Reinforced Plastics, Ltd., 11-14, Bath Lane, Leicester.
Ries, B. H., Ltd., 19-21, Hatton Garden, London, E.C.1.
Remington Rand, Ltd., 26-40, Kensington High Street, London, W.8.
Remploy, Ltd., 25-28, Buckingham Gate, London, S.W.1.
Revo Electric Co., Ltd., Tipton, Staffs.
Robson Electrical Products, Ltd., Ultralite Works, Union Street, West Bromwich.
Rolls Razor, Ltd., 255, Cricklewood Broadway, London, N.W.2.
Ronson Products, Ltd., 352, Strand, London, W.C.2.
Rowlands Electrical Accessories, Ltd., REAL Works, Hockley Hill, Birmingham, 18.
Runbaken Electrical Products, Burton's Buildings, 71-73a, Oxford Road, Manchester, 1.
Russell Hobbs, Ltd., 1, Bensham Lane, West Croydon.

S.L.R. Electric, Ltd., Welbeck Road, South Harrow.
Santon, Ltd., Somerton Works, Newport, Mon.
Santos Manufacturing Co., Ltd., 5, Chalk Farm Road, London, N.W.1.
Sax, Julius, & Co., Ltd., 24, Commerce Road, Brentford.
Scott Smith, J., Ltd., 3, Gresham Road, Brentwood, Essex.
Scottish Precision Engineering Co., Ltd., 27, Cadogan Street, Glasgow, C.2.
Selex Electrical Co. (Kirkby), Ltd., Yardley Road, Kirkby Trading Estate, nr. Liverpool.
Senior, John, & Co. (1954), Ltd., Holywell Green, Halifax.
Sew-Tric, Ltd., Honeypot Lane, Stanmore, Middlesex.
Shanks, Alexander, & Son, Ltd., 66, Victoria Street, London, S.W.1.
Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.
Simister, Samuel, & Co., Copper and Tin Works, Croston Street, Bolton.
Simplex Electric Co., Ltd., Creda Works, Blythe Bridge, Staffs.
Sims, H., 191, Goldhurst Terrace, London, N.W.6.
Siroma Engineering Co., Ltd., North Acton Road, London, N.W.10.
Skarsten Manufacturing Co., Ltd., 21, Hydeway, Welwyn Garden City, Herts.
Slumberland, Ltd., 11, Conduit Street, London, W.1.
Smith, Herman, Smithlite, Ltd., Empire Works, Dudley.
Smith, W. H. (Eziot), Ltd., 32, Mansfield Street, Churchgate, Leicester.
Smiths English Clocks, Ltd., Sectric House, Waterloo Road, London, N.W.2.
South Wales Switchgear, Ltd., Blackwood, Mon.
Speights, Ltd., Classic Works, Mill Road, Dewsbury.
Sperryn & Co., Ltd., Moorsom Street Works, Birmingham, 6.
Standard Telephones & Cables, Ltd., 63, Aldwych, London, W.C.2.
Stanley Bros. of Aldershot, Ltd., North Lane, Aldershot.
Steel Radiators, Ltd., Stelrad Works, Southall, Middlesex.
Stokes Fountains, Ltd., 185-187, London Road, Croydon.
Straight-Lite Reflectors, Ltd., 36, Eden Grove, Holloway, London, N.7.
Sun Electrical Co., Ltd., 118-124, Charing Cross Road, London, W.C.2.
Sunbeam Electric, Ltd., 14-16, Old Quebec Street, London, W.1.
Surgical Equipment Supplies, Ltd., Westfields Road, London, W.3.
Sutcliffe & Clarkson, Whittlefield Mill, Burnley, Lancs.

T.M.C.-Harwell (Sales), Ltd., 37, Upper Berkeley Street, London, W.1.
Tarpen Engineering Co., Ltd., Ixworth House, Ixworth Place, London, S.W.3.
Taylor (Albert) (Manchester), Ltd., Isola Works, Quay Street, Manchester, 3.
Teesmade Co., 52, Lansbury Drive, Hayes, Middlesex.
Tellus Super Vacuum Cleaner, Ltd., 39, Sheen Lane, Mortlake, London, S.W.14.
Telsen Electric Co. (1935), Ltd., Fitzgeorge Street, Manchester, 9.
Temperature, Ltd., Burlington Road, Fulham, London, S.W.6.
Thermalux Electrical Products, Ltd., Talbot Works, Lewis Street, Halifax.
Thermat, Ltd., Baldwin House, 132, Arkwright Street, Nottingham.
Thermega, Ltd., 51-53, Victoria Street, London, S.W.1.
Thermolectrics, Ltd., Chapel Works, Church Street, Hampton-on-Thames, Middlesex.
Thermoset Appliances, Ltd., Chapel Works, Failsworth, Manchester.
Thomas, Bertram (Engineers), Ltd., Worsley Street, Hulme, Manchester.
Thomas, Fredk., & Co., Ltd., Everton Buildings, Stanhope Street, London, N.W.1.
Thorn Electrical Industries, Ltd., 105-109, Judd Street, King's Cross, London, W.C.1.
Tividale Foundry, Ltd., Local Board Road, High Street, Watford.
Tomlinson, F. J., Ltd., Hall Carr Mill, Rawtenstall, Lancs.
Tricity Cookers, Ltd., 109, Kingsway, London, W.C.2.
Troughton & Young (Lighting), Ltd., 143, Knightsbridge, London, S.W.1.
Truvox, Ltd., 15, Lyon Road, Harrow, Middx.
Tym's Electric, Systym Works, Kennard Road, Stratford, London, E.15.

Unity Heating, Ltd., Chilworth Manor, Southampton, Hants.
Universal Boilers & Engineering Co., Ltd., Fulledge Works, Burnley.

Vactric, Ltd., 196, Sloane Street, London, S.W.1.
Vacuums, Ltd., Aldridge Road, Birmingham, 22b.
Valmade, Ltd., New Chapel Road, Feltham.
Vent-Axia, Ltd., 9, Victoria Street, London, S.W.1.
Vidor, Ltd., West Street, Erith.
Vulcan Fumigator Co., Ltd., 3, New London Street, London, E.C.3.

Walker, E., & Co. (Electrical Engrs.), Ltd., Phœnix Works, The Hyde, Hendon, London, N.W.9.
Walls, Ltd., Palmer Street, Birmingham, 9.
Walter, J. & H., Ltd., Farm Lane, Fulham, London, S.W.6.
Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester, 6.
Wardle Engineering Co., Ltd., Elsinore Road, Old Trafford, Manchester, 16.
Warmex, Ltd., 375, Milton Road, Cambridge.
Warm-Glow Co., Ltd., Progress Road, Leigh-on-Sea, Essex.
Warner, A. E. (London), Ltd., 56, Brewer Street, London, W.1.
Water Softener & Vacuum Cleaner Service, Ltd., 248, Romford Road, London, E.7.
Watson & Sons (Electro-Medical), Ltd., East Lane, North Wembley.
Weatherhead & Co. (Glasgow), Ltd., 459-463, Hillington Road, Hillington Industrial Estate, Glasgow, S.W.2.
Webb, H. C., & Co., Ltd., Tame Road, Birmingham, 6.
Webb's Crystal Glass Co., Ltd., 2-3, Norfolk Street, London, W.C.2.
Westerman, F. (Wholesale), Ltd., 94, Dale End, Birmingham, 4.
Westinghouse Brake & Signal Co., Ltd., 82, York Way, London, N.1.
White Bros. & Jacobs, Ltd., 45-46, Chalk Farm Road, London, N.W.1.
Wholesale Fittings Co., Ltd., 46, 50 and 52, Commercial Street, London, E.1.
Wilkins & Mitchell, Ltd., Phœnix Works, The Green, Darlaston.
Willectric Thermall Co., Ltd., 11a, East Cliff, Dover, Kent.
Williams, R. A. (Birmingham), Ltd., Stero Works, Haslucks Green Road, Shirley, Birmingham.
Windak, Ltd., Woodside, Poynton, Cheshire.
Wolf Electric Tools, Ltd, Pioneer Works, Hanger Lane, London, W.5.
Wraithe Bros., Nuttall Street, Blackburn.
Wye Valley Hand Weavers, Ross-on-Wye.

Yelsen, Ltd., Roxley Corner, Footscray, Kent.

Appliance Surveys: *New Series*

DURING the twelve months since our last Domestic Issue most of the more widely used appliances have been dealt with in detail in a series of illustrated surveys. These have appeared at three-weekly intervals in the *Electrical Review* and the following is a complete list of the subjects covered, together with the date of issue:—Thermal Storage Water Heaters (22nd October, 1954); Immersion Heaters (12th November); Washing Machines (3rd December); Wash Boilers (24th December); Irons (14th January, 1955); Kettles (4th February); Vacuum Cleaners (25th February); Floor Polishers (18th March); Refrigerators (8th April); Dry Shavers (6th May); Coffee Percolators (20th May); Toasters (10th June); Food Mixers (1st July); Hair Dryers (22nd July); Blankets and Pads (12th August); Cookers (2nd September); Fires (23rd September).

In view of the heavy demand for these issues it is regretted that several are now out of print, but we are continuing the series in order to provide up-to-date information with regard to prices, design alterations and the announcement of any new models which may come on to the market. Next week we shall be dealing with low temperature heaters and subsequent surveys during the next two months will cover thermal storage water heaters, immersion heaters, wash boilers, etc.

Interference Suppression

Methods of Dealing with Small Motors

By R. DAVIDSON,
B.Sc., A.Inst.P.*

THE Postmaster General was empowered by the Wireless Telegraphy Act, 1949, to introduce statutory regulations to prevent interference with radio and television reception. The first regulation to be made under these powers came into force on July 1st, 1953, and covered the compulsory fitting of suppressors to the ignition systems of cars and other vehicles during manufacture. Two more regulations were tabled in Parliament on March 1st of this year and provide for the control of interference caused by small electric motors and refrigerators. The first of these regulations covers a very wide field and is of vital concern to the manufacturers of electrical appliances incorporating small commutator motors. The regulation, as tabled, requires suppression of interference to within specified limits on any electric motor below a certain rating used in the United Kingdom. As a regulation governing the use of electric motors, it places no onus on the manufacturers to fit suppressors but it follows that makers of electrical appliances will feel the effect of the new regulations in increasing customer resistance to the sale of unsuppressed appliances. The second measure, providing for the control of interference caused by refrigerators, places the onus for such control on the manufacturer, importer or assembler. Both of these regulations came into force on 1st September last and will inevitably bring with them new problems to many manufacturers. In this article the various aspects of interference suppression are outlined with a view to assisting those who plan to fit suppressors during assembly, and those who wish to provide for the easy fitting of suppressors, where necessary, to appliances after sale.

The electric motors regulation covers all those electric motors having a continuous rating of less than 1 h.p. per 1,000 r.p.m. and generators or convertors having continuous ratings of less than 0·75 kW or kVA per 1,000 r.p.m. Switchgear and controlling apparatus directly connected with such equipment are also included. In general, only d.c. motors, universal motors, rotary convertors and d.c. generators cause interference although the switchgear associated with a.c. motors may, in isolated cases, cause sufficient interference to come within the scope of the regulation. The maximum permitted noise levels of both mains-borne and radiated interference are the same as those laid down in B.S. 800 "Limits of Radio Interference" for the frequency ranges 200 to 1,600 kc/s and 40 to 70 Mc/s and are designed to give adequate protection to efficient receiver installations in areas of moderate signal strength. The regulation will no doubt be extended in due course to cover Band II (87·5 to 100 Mc/s) and Band III (174 to 216 Mc/s) when sufficient experience is available of operating conditions at these frequencies.

To understand the principles of interference suppression it is essential to know something of the ways in which interference is propagated. The changes in the supply current at the brush/commutator interfaces of a motor cause radio frequency currents to flow in the associated wiring. The radio frequency energy may be propagated, in the first instance, by direct radiation from the motor and by conduction along the supply lines. Further radiation may occur from the supply wiring, often at points remote from the motor, and re-radiation may take place from adjacent wires, cables or metalwork. Most cases of interference result from the reception by the receiver aerial system of the radiated components of the radio frequency energy, although in some cases interference may be injected at the supply terminals of the receiver by direct conduction along the mains wiring.

Radio frequency currents flow in the supply wiring to a motor in two modes. The symmetrical component flows from one terminal of the motor along one supply line and returns to the motor via the other supply line. The asymmetrical component flows from the motor along both supply lines treated as one and returns via earth to the frame of the motor. In the case of unearthed appliances the return path to the frame of the motor is provided by the stray capacitance between the frame and earth. It is the asymmetrical component which is the major cause of interference and it is this component which is measured at the supply terminals of the motor in the procedure laid down in the regulations.

Measures which can be taken at the receiver for the abatement of interference are necessarily limited. To reduce the effects of radiated interference it is sometimes possible to adjust the aerial system to improve the signal to noise ratio by increasing the aerial height or by re-siting. Where interference is conducted to the receiver via the mains supply its effects can be limited by the use of a suppressor plug on the receiver supply cord or, in more severe cases by the use of a filter in the mains supply. Unfortunately these measures often prove to be no more than palliatives and suppression of interference is usually required at the source.

There are certain factors in the design of a commutator motor which materially affect the noise levels generated by the motor and the extent of the measures required to reduce these noise levels to acceptable limits. One of the most important factors is the impedance at radio frequencies of the series field windings of the motor. Field windings with similar characteristics on d.c. or at supply frequencies can have widely differing characteristics at radio frequencies. Apart from the normal winding parameters, the impedance of a field winding at radio frequencies will depend upon the self-capacitance of the winding and on the permeability/frequency characteristic of the core material. In general, if the radio frequency impedance of a series field winding is high, the interference noise levels of the motor will be moderate and simple suppression will suffice since the field winding will materially assist in suppression. Motors with low impedance field windings tend to have higher unsuppressed noise levels and require more complicated suppressor networks. Motors with symmetrical field windings are easier to suppress than those with a single winding in one supply line.

Where motors are controlled by centrifugal governors operating contacts which reduce or interrupt the supply current, it is preferable, from the suppression point of view, that the governor be connected between one field winding and the armature rather than on the supply side of the field winding. Adequate arc suppression at the governor

* Dubilier Condenser Co. (1925), Ltd.

contacts of a controlled speed motor reduces the noise generated by the governor but additional radio frequency suppression is almost always required on such motors. Poor quality brushes having voids and hard spots are a further source of high noise levels. Few motor manufacturers have yet devoted much attention to the radio frequency characteristics of their products but it is apparent that further research by them on this subject would probably result in a material reduction in the cost of suppression.

Although it is possible to produce commutator motors having interference noise levels low enough not to require suppression under the new regulations, there are at present very few such types in use in the domestic appliance field where large numbers of commutator motors are employed. For motors which require suppression there is, unfortunately, no set formula which can be applied to guarantee that noise levels will be reduced to within given limits. The types of suppressor and the degree of suppression required will depend, amongst other things, on the frequency distribution of the noise, the method of earthing (if any) and upon whether the appliance is fully or doubly insulated.

The basic principles of suppression at the source are, however, straightforward and may be briefly summarized as follows:—

(i) The radio frequency impedance across the supply lines to the motor must be reduced in cases where the symmetrical component requires suppression. This is effected by fitting a suitable capacitor across the supply lines usually on the supply side of the field windings.

(ii) The radio frequency impedance between the supply lines and earth must be reduced in appliances where the asymmetrical component requires suppression. This is effected by fitting a suitable capacitor between each supply line and the frame of the motor.

(iii) Where the measures in (i) and (ii) are inadequate the radio frequency impedance of the mains supply must be increased by fitting suitable inductors in series with the supply lines.

Frequency Range

Because most suppressor components have frequency characteristics which limit the frequency range over which they are fully effective it is often necessary to fit one set of components for suppression at radio frequencies and another set for television frequencies. Thus a motor causing severe interference over both frequency bands will require all of the suppressors shown in Fig. 1. It is essential that suppressors for television frequencies should be fitted either inside the motor or appliance housing or in the supply lead. Fortunately, they are small and can be fitted within most motor housings. Suppressors for sound radio frequencies are larger but the positions in which they can be fitted are not so critical and they will be effective either within the appliance, in the supply leads or at the supply terminals.

The past few years have seen rapid developments in suppressor components and, as usually happens in these circumstances, little standardization has yet been achieved. The diversity of types of appliances has also made standardization difficult and there has been a tendency to develop special suppressors for specific makes, and shapes, of appliances. However, for television frequencies, the small self-resonant iron dust cored chokes of the types illustrated in Fig. 2 (b) have been generally adopted as the main suppressor component for these frequencies. Where extra television suppression is required, the recently developed 3×470 pF ceramic dielectric capacitor may find widespread use (Fig. 2 (a)). The television chokes are

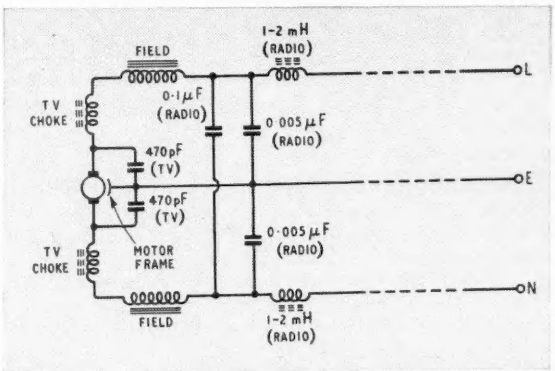


Fig. 1.—Typical circuit for suppression of a series wound motor at radio and television frequencies

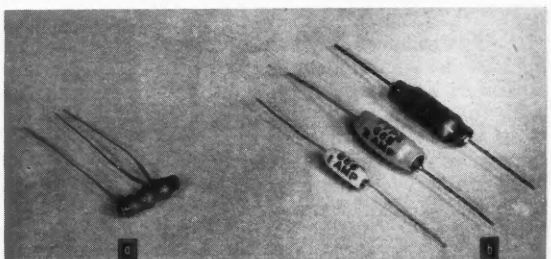


Fig. 2.—Miniature components for suppression at television frequencies. (a) 3 × 470 pF capacitor unit; (b) Iron dust cored chokes. (Dubilier)

connected either in series with the supply lines to the motor or in the brush leads as in Fig. 1. The capacitor unit is usually connected with one lead to the frame of the motor and one lead to each brush housing.

For suppression at sound radio frequencies the combined capacitor unit with a capacitance of from 0·02 μF to 0·2 μF for connection between supply lines and $2 \times 0{\cdot}005$ μF for connection between lines and frame is commonly used. It is usually connected on the mains side of the field coils of the motor as in Fig. 1. Such units are available potted in rectangular boxes or in tubular waxed cardboard or metal containers. Separate capacitors suitably rated can, of course, be used in place of the combined unit where this is physically more convenient. Safety considerations, which are referred to in more detail later, limit the permissible capacitances that can be used on certain types of motors to values which are not, unfortunately, the optimum for suppression purposes. Thus it often happens that the best suppression obtainable with capacitors fitted in compliance with the safety recommendations is not good enough to reduce noise levels to within the required limits. Recourse must then be made to radio frequency chokes which are comparatively bulky and often difficult to house unless provision has been made for them at the design stage. They are fitted in the supply leads to the motor on the supply side of the radio frequency capacitors and must, of course, be suitably rated to take the full load current of the motor. Radio frequency chokes are usually paired on a common core with connections so arranged that the supply current flux is cancelled out. They are available wound on iron dust, flaked iron and ferrite cores with inductance values in the range 0·5 to 5·0 mH.

Manufacturers of motors and appliances will be interested, from the point of view of suppression of their products already in the field, in suppressors which can be

fitted outside the appliance. Flex lead suppressors are available for both television and radio frequencies. Those designed for television must be fitted within 9 inches of the appliance to be effective. For suppression at radio frequencies 5 A, 13 A, and 15 A, three-pin suppressor plugs are marketed fitted with capacitors between line and neutral and between neutral and earth. An example of a 13 A suppressor plug is shown in Fig. 3. The permissible capacitance values are greater than those that can be fitted within the appliance and such plugs can therefore be very effective at sound broadcast frequencies. In the larger type of electrical appliance such as calculating machines, accountancy machines and ciné projectors space often permits the fitting of a combined filter unit comprising capacitors, TV chokes and RF chokes suitably interconnected for suppression of both television and sound radio interference.

A reference was made earlier to the fact that most suppression components have frequency characteristics rendering them unsuitable for suppression over a wide frequency range. In the case of capacitors, this limitation is due to the inductance of the element and the connecting leads which gives the capacitor a rising impedance-frequency characteristic above the self-resonant frequency. There is one type of capacitor, known as the lead-through or bushing capacitor, which by design has negligible self-inductance and is effective, if properly fitted, over all frequencies up to at least 200 Mc/s. These capacitors are available in a wide range of capacitances and are specially suitable for suppression of d.c. generators and motors and d.c./a.c. convertors where the supply currents are of an order which precludes the use of series inductors and where capacitances are not limited to very low values by safety considerations. Fig. 4 illustrates the low impedances obtainable at high frequencies with this type of capacitor and shows a comparison with the frequency-impedance characteristic of a tubular capacitor of equal capacitance having 2in connecting leads. The impedance of a lead-through capacitor approximates to that of an ideal capacitor, decreasing with increasing frequency. Minor parallel resonances occur at certain frequencies dependent on the internal construction of the capacitor. In this type of capacitor a central conductor, to which one capacitor electrode is connected, carries the supply line through the capacitor. The other capacitor electrode is connected non-inductively to the metal case of the capacitor which must be securely bolted to the metal casing of the motor or generator usually by means of a flange. Examples of various types of lead-through capacitors are shown in Fig. 5.

Safety of Appliances

Manufacturers of electrical appliances must ensure that any suppressor arrangement they consider fitting, or recommending, is safe in all normal circumstances in which the appliance will be used. One of the most important considerations is that suppressor capacitors fitted within appliances or in the supply cord shall be so limited in capacitance value that in no circumstances can users receive a dangerous shock from contact with the exposed metal work of the appliance. Maximum permissible capacitances which may be connected in the various positions within an appliance, in the supply cord and at the supply plug are laid down in B.S. 613: 1955 " Components and Filter Units for Radio Interference Suppression."

Within a portable appliance not doubly or fully insulated, and designed for 250 V a.c. operation the maximum capacitance which may be fitted from either supply line to the metal work of the appliance is 0·005 μF. In no circumstances should this value be exceeded and even with this capacitance a slight sensation of shock may be

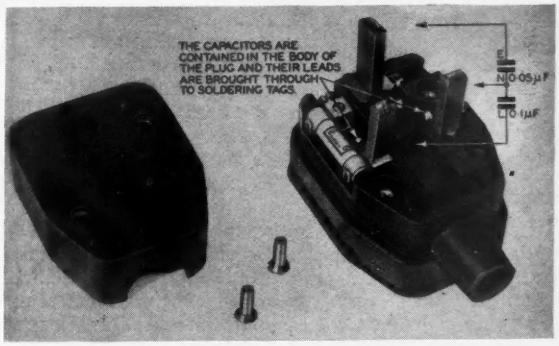


Fig. 3.—13 A plug for interference suppression at sound broadcast frequencies. (H.M. Postmaster General)

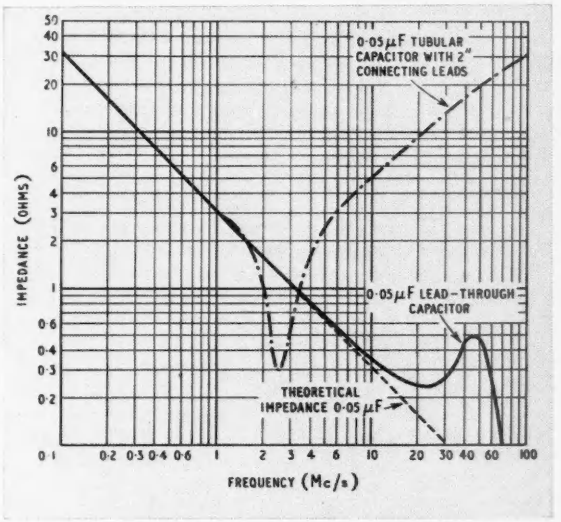


Fig. 4.—Impedance-frequency characteristics of 0·05 μF lead-through capacitor and equivalent tubular type

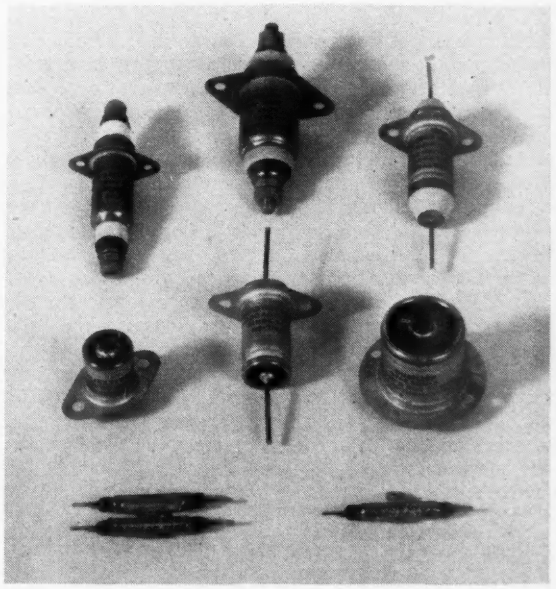


Fig. 5.—Examples of lead-through capacitors for suppression up to very high frequencies (Dubilier)

felt on contact with exposed metal work if an earth lead is not connected. With 0·002 μF from supply lines to frame the shock sensation when the appliance is operated unearthed is reduced to negligible proportions but the efficiency of the suppression is reduced. In the case of doubly insulated appliances operating on 250 V a.c. a maximum capacitance of 0·05 μF is permitted between the supply lines and the motor frame but such capacitors must never be connected to exposed metal work. For fully insulated appliances there is no limitation from the safety aspect on capacitance connected between lines and frame. At the supply plug, where transposition of line and neutral is less likely than within the appliance, capacitances of up to 0·05 μF may be connected between the line and neutral pins and between the neutral and earth pins. Thus it is often possible to obtain good suppression at radio frequencies by use of a suppressor plug when capacitance limitations prevent efficient suppression within the appliance.

The second important safety consideration is that components used for the various suppressor applications are suitably rated and of a sufficiently high grade. In particular, capacitors connected in positions where failure would mean a risk of shock to the user of the motor or appliance must have a margin of safety sufficient to make failure most unlikely. For this reason only components complying with B.S. 613 should be used for suppression purposes.

The introduction of the regulations governing interference suppression preceded by about three weeks the first commercial television broadcast on Band III. Many manufacturers of domestic appliances have been wondering what interference problems will exist at Band III frequencies. For various reasons no comprehensive picture can yet be given of these conditions. One of the main reasons for excluding Band III from the frequencies covered by the regulations, as they stand at present, is that it is impossible to lay down permissible limits of noise at these frequencies until some field experience has been gained after a period of full power transmissions. There are some factors, however, which may make it possible to have higher permissible limits of interference noise on Band III than on Band I. Generally speaking, for comparable picture quality, receivers require a greater signal on Band III than on Band I. For this reason, outside very strong Band III signal areas, it is necessary to have an efficient, well sited, aerial system. This tends to improve interference conditions especially as Band III aerials are highly directional and will receive interference over a smaller angle than Band I aerials. Measurements have shown that many types of commutator motors generate somewhat less interference on Band III than on Band I and that Band I suppressors will, in many cases, provide adequate suppression over Band III. On the other hand, Band III service areas are expected to be smaller than Band I areas and there will inevitably be a tendency for people to try to receive the commercial broadcasts outside the service areas. Under these conditions interference is likely to be severe.

In conclusion, mention must be made of the Code of Practice (C.P. 1006: 1955) on the general aspects of interference suppression which has recently been published by the British Standards Institution. In conjunction with B.S. 613 and B.S. 800 this will be of great assistance to all makers of appliances likely to cause interference.

Domestic Equipment Standards

The Pursuit of Safety and Convenience

By A. T. VULLIAMY, M.A., A.M.I.E.E.*

THE benefits of standardization in the field of domestic electric supply and appliances are now taken very much for granted. Partly because of an obvious need, the standardization of frequency and the dimensions of accessories such as plugs and socket-outlets have steadily progressed towards a uniformity which is of manifest advantage to everyone. More attention is now being given to new and improved standards for the more detailed characteristics of all the familiar domestic electrical equipment which is now an essential part of every home.

Progress has not been made without difficulties and a great deal more remains to be done nationally as well as internationally, as we shall see later in this article. For the basic requirements of safety, interchangeability, ease of installation and of use there is a strong common interest between the user, the supply authority and the manufacturer. As the scope of standards extends to matters such as rating and performance, it becomes more difficult to devise specifications and tests which will make new standards of value to the user without being inflexible or restrictive to the progressive designer and manufacturer. It is therefore important that standards should be frequently revised or replaced. This process of revision brings to the British Standards Institution and its committees the advantages of receiving comments not only from the widest possible range of interested bodies in the United Kingdom, but also from standards organizations overseas, and it gives an opportunity for British Standards to be reviewed in relation to international standardization. The following brief résumé of ten recently published British Standards includes a number of such revisions.

B.S. 1326—Domestic electric washboilers.—The Standard is for domestic electric washboilers with heating elements for use on a.c. or d.c. supply. The section on construction is mainly concerned with sound and robust design and manufacture. The tests to ensure compliance include rough handling, endurance and stability on an inclined plane. High voltage, insulation resistance and earthing continuity tests are required.

B.S. 1555—Thermostats for electrically-heated hot water supply (a.c. only).—This Standard covers thermostats of the air-break type for use with immersion heaters and storage water heaters for domestic hot water supply, such as are used in thermostatic immersion heaters made to B.S. 1556 and to B.S. 843, with a maximum current rating of 15 A. The main object is to provide the necessary range of types and sizes with the highest practicable measure of interchangeability, but some details of design and tests are included.

B.S. 1556—Electric immersion heaters (including heaters incorporating thermostats for use on a.c. only) for domestic hot water supply.—The object of this Standard is to provide

* Senior Technical Officer, British Standards Institution.

a range of immersion heaters suited to the range of tanks and cylinders specified in B.S. 417—Galvanized mild steel cisterns, tanks and cylinders, and in B.S. 699—Copper cylinders for domestic purposes. It is also designed to ensure interchangeability between heaters of different manufacture. Although, here again, control of quality is not a primary object of the Standard, certain design details and tests have been included. Both withdrawable and non-withdrawable type electric immersion heaters, with loadings of 1, 2 or 3 kW, and suitable for a.c. or d.c. supply, are included.

B.S. 1645—Domestic electric vacuum cleaners.—This Standard applies to domestic vacuum cleaners of the portable motor-operated type for a.c. or d.c. supply and is concerned with safety rather than with performance. Double insulation is recognized for the first time in a British Standard. It includes tests for high voltage, insulation and earth continuity as well as tests for loading and temperature rise.

B.S. 1671—Domestic electric kettles.—The two commonly used types of kettle, with an immersion heater or with a heater clamped on to the underside of the water compartment, are covered by this Standard, but non-metallic designs are not included. The aims are, briefly, sound construction, performance and safety. The electrical tests include a measurement of leakage current as well as the usual high voltage, insulation resistance and earth continuity tests. In addition to temperature and loading tests the performance of a kettle is checked by a test of thermal efficiency.

B.S. 1671—Domestic electric irons.—This Standard is for domestic electric irons with or without thermostatic control and, like other Standards for domestic electric appliances, pays particular attention to safety precautions. Details are given regarding the construction of the cover to provide adequate protection to the user under working conditions, and the arrangement of the supply connection to prevent any inadvertent contact with live metal. As well as the usual electrical and temperature tests, there are a mechanical shock test, a 500-hours' life test and a vibration test. An appendix gives information on a method of measuring leakage current.

B.S. 1789—Electric heating pads.—The Standard applies to two types of electric heating pads and their associated control devices for connection to a.c. or d.c. supply, viz.: Type A—Normal use (moisture-resistant); Type B—Waterproof. The maximum size in each case for one side only is 400 sq in. In addition to high voltage and insulation resistance tests, some practical tests of functional qualities are included.

B.S. 2607—Electric coffee percolators and brewers for domestic use.—Minimum safety requirements are specified for domestic electric coffee percolators and brewers, having elements of various types intended for operation on either a.c. or d.c. supply. The Standard includes clauses dealing with design and construction of the body, spout, lid, handle, heating elements, safety devices, etc. Among the tests specified are those of stability on an inclined plane loading, temperature rise and endurance. An appendix deals with the method of measuring leakage current.

B.S. 2608—Electric toasters for domestic use.—This Standard establishes minimum requirements for domestic electric toasters with heating elements intended for operation on a.c. or d.c. supply. It includes clauses on the design and construction of the body, handles, feet, heating element, toast delivery, finish, ventilation and shielding, and automatic control. The comprehensive section on tests includes an endurance test and a toasting test.

B.S. 2612—Electrically heated blankets.—The Standard applies to electrically heated blankets for domestic and similar purposes for connection to a.c. or d.c. supply and provides standards of mechanical and electrical construction, and the maximum possible degree of safety. It does not deal with electrically heated mattresses or mattress overlays. It also applies to electric blankets connected to a double-wound transformer. Instructions for use and marking and detailed requirements for tests are also included. A blanket complying with the Standard must bear the B.S.I. certification mark.

From the foregoing short descriptions it will be seen that the B.S.I. is following its usual practice of making each Standard complete and self-contained as regards the main subject. Naturally it is necessary to refer to other Standards for details of accessories such as switches, plugs, connectors and cables.

Apart from such vital safety requirements as the guarding of electric fires and the insulation of exposed metal surfaces, it is frequently in connection with the accessories that the most important considerations of safety arise. Elementary as they may seem, it is from faults in the electric supply connections, switching and earthing, that danger and accidents may be expected to arise and it is in this respect that nationally and internationally agreed improvements in safety rules could be of particular value.

To take one example of the difficulties that remain to be overcome: there is a growing tendency in almost all countries for manufacturers to supply equipment with a fixed connecting cable rather than a connector on the appliance, but there is no agreed system of colour identification for the cores of these cables. By long established practice, green is used in the United Kingdom, and in some Commonwealth countries, to identify the earth wire. An advantage of the British system of using red for the phase wire and green for earth is that it is in harmony with the recommendations for safety colours of the International Organization for Standardization, where red signifies danger and green is the colour for safety measures. There is, however, at present a majority on the Continent in favour of using red for earth and there is no immediate prospect of reaching uniformity. Something must be done to guard against what might be very serious consequences from wrong connections, and the best hope of an immediate solution lies in an agreed system of marking the connections by a label, as already practised by some British manufacturers.

This draws attention to the need for a universally accepted symbol for earth. Attempts to obtain international agreement on letter symbols usually founder on the language difficulty; a suitable pictorial symbol is very much to be preferred. Happily the earth symbol ⏚ is now recognized throughout the world and its use is increasing.

Work of the C.E.E.

Although safety requirements are the basis of most of the national approval schemes which are being enforced in many countries, the problems of international standardization are, of course, not so simple as this. The growing complexity of national standards might threaten to become a serious obstacle to international exchanges of electrical equipment if there were no co-ordination. This is one of the main reasons why increasing attention is being paid to the work of the International Commission on Rules for the Approval of Electrical Equipment, known for short as the C.E.E. This organization works in parallel with the International Electrotechnical Commission, and one of its principal objects is to introduce specifications, particularly for test methods, which will lay down uniform minimum standards of " quality " and will take the place of a multiplicity of different tests used by different countries for one purpose. The C.E.E. membership is confined to European countries, but the C.E.E. publications are achieving a world-wide distribution. The United States sends observers to its meetings.

Although its aims are still some way from being realized, progress is being made. A manufacturer familiar with the C.E.E. specification will know the tests which his equipment will be expected to pass in many if not all the Continental countries. The time may come when one test

certificate will give the entrée to all C.E.E. member countries for equipment manufactured to conform to the agreed specification.

Another feature of the C.E.E. that is important for export trade, is the pooling of experience between test laboratories in the member countries. This collaboration should contribute to improvement in test methods which will determine the safety and functional efficiency of appliances without hampering the skill and ingenuity of the designer. Satisfactory tests for tracking resistance and the stability of new insulating materials under the widest possible range of conditions are typical examples of subjects that are being studied by technical committees of the C.E.E. It is essential that representatives of manufacturers should continue to play a full part in this work and that expert advice should be available from those responsible for the development of new materials and methods.

The above brief description of the work of the C.E.E. naturally leads one to the question: What is being done in the Commonwealth? B.S. 816—Requirements for electrical appliances and accessories, is well known and widely used. Good use has been made of other British Standards in most countries of the Commonwealth, although each has naturally introduced modifications to suit local climate and conditions. As a step towards uniformity the possibility of introducing a general code of recommendations for materials, construction and tests, is now being considered. A discussion took place at the Commonwealth Standards Conference in 1951 and more detailed proposals are likely to be discussed at a future Commonwealth Conference.

The contributions of standardization to reliability and effectiveness of electrical appliances and accessories may well be taken for granted, but there is some cause for alarm if safety is taken for granted also. It is all to the good that every electrical appliance is no longer looked on as a potential source of danger, but accidents can occur with the best of equipment. Standards cannot always provide against the results of ignorance or misuse; the best safeguard is the education of the user. Here the manufacturer by clear marking and instructions, the contractor through personal contact with the user, and the Electricity Boards with their many opportunities for "propaganda" can all play an important part in creating a better understanding of the safety principles which standards are helping to promote.

Testing Domestic Equipment

The Work of the E.D.A. Leatherhead Establishment

By RICHARD HARVEY, B.Sc., A.Inst.P.*

IT was in 1948 that the E.D.A. Testing House was founded by the British Electrical Development Association as a "tool" for the E.D.A./B.S.I. Advisory Committee on Electrical Appliances and Accessories. This body, which first met in 1947, was set up jointly by the British Electrical Development Association and the British Standards Institution shortly after the war as a result of a fear that a large number of firms which had been making war material and would be looking for new fields would turn to the electrical industry as being the outlet for which their plant and workers were most suited.

It was realized that such firms might not have the necessary technical background with the result that a large number of unsafe electrical appliances would come into the market. The Committee's method of working was to offer to examine any appliance that was brought to its notice and take the matter up with the manufacturer if it was felt that his product was in need of some improvement to make it safer.

It is, of course, obviously necessary for such a body to have the services of an organization which can examine equipment in detail and subject it to the necessary tests, including endurance tests, which may be required to determine whether it is safe. For this purpose the Electrical Development Association established a Testing House, originally in a part of its Head Office premises in London, where a considerable amount of work was undertaken in examining appliances, particularly of the portable domestic type.

The work and the scope of the Testing House rapidly increased and it became obvious that it could be of considerable assistance to some of the Area Boards who were members of E.D.A. The emphasis, therefore, began to change and performance began to play an increasing part in the examination of equipment submitted for test.

Much work was, and is, still being done for the Advisory Committee, and members of the public, wholesalers, retailers or other interested bodies who may have doubts regarding the safety of any electrical equipment are still asked to get into touch with the Secretary of the Committee at 2, Savoy Hill, London, W.C.2.

Nevertheless, more and more work was being done in testing equipment for manufacturers who wished to gain Area Board approval and early in 1950 it became obvious that there was insufficient room in the London premises and a new building was started at Leatherhead; this was officially opened in 1953. With the greater facilities then available the services offered by the Testing House to the electrical industry were increased; it became possible for manufacturers to have their appliances examined for compliance with British and overseas specifications and to receive a full test report. This report would also certify that the appliance complied with the specification if that proved to be the case. The Testing House is now working in conjunction with the B.S.I. in undertaking the tests necessary for the issue of the "kite" mark which has recently been applied to electric blankets.

There is ample room for future development at Leatherhead, but for the present the organization is concentrating on domestic and light industrial appliances. There are two main divisions, one devoted to portable appliances, and one to the larger free-standing appliances such as washing machines, cookers, refrigerators, etc.

Each division consists of a main laboratory, with its

* Testing House Manager, British Electrical Development Association.

associated offices and test rooms, and each laboratory has been specially designed for its purpose. Thus the portable apparatus laboratory has a maximum of fixed bench space with all the necessary supplies taken to terminals and socket outlets on a panel at the back of each bench. On the other hand, the large apparatus laboratory is designed to have a completely clear floor; the supplies are taken to distribution panels suspended from the ceiling and all the instruments, etc., are mounted on trolleys or trolley tables. These two main laboratories share facilities offered by the photographic and X-ray departments, the chemistry laboratory and the workshop.

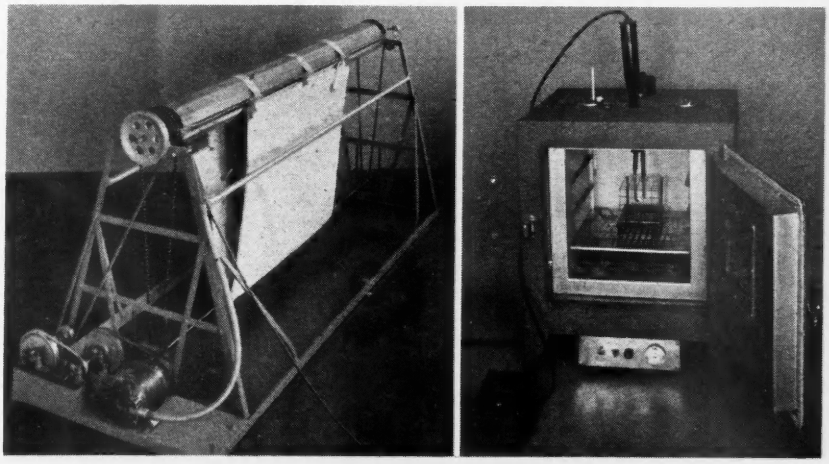
So far as the tests themselves are concerned, much has already been said, both in this journal and in other publications, regarding the standard tests such as temperature, insulation resistance, etc., and it is not proposed at this stage to describe them in detail. What is not generally realized is the amount of work that goes into the examination and testing of any particular appliance. Take, for example, a report on an electric iron. The first three or four pages will contain a detailed description of the iron and its component parts. This description is usually prepared after the iron has finished its test when it is taken completely to pieces. The "description" section of the report not only gives the test engineer an opportunity of pointing out any defect in the construction but it places on record constructional details and enables a comparison to be made with samples that may be tested at a later date. The report also contains photographs of the appliance and its component parts; these are intended to supplement the descriptive section.

The second section of the report outlines the test results. There are tests for stability, mechanical shock, loading, earth leakage current, insulation resistance, both under normal conditions and after conditioning in a humid atmosphere, earth connection resistance, temperature tests while the iron is on its stand and during the ironing operation, a test of the cord anchorage, an endurance test and a test designed to show that none of the parts will come loose with the bumping and vibration that the appliance is likely to undergo during normal service.

Finally, the report is summarized for easy reference and this summary or an extract is sent to the manufacturer so that he may have an opportunity of commenting on any of the points which may have been criticized.

Different appliances have, of course, different tests, but in general the report will follow the lines outlined above, from which it will be seen that the thorough testing of a domestic appliance is not a quick or simple undertaking. In addition to this routine testing a considerable amount of time is spent in the development of new test methods and apparatus to keep pace with new designs. In this connection the association of the Testing House with the International Commission on Rules for the Approval of Electrical Equipment (C.E.E.) should be mentioned. This has provided a valuable link in bringing about regular discussions with the corresponding testing stations abroad. Not only has this been helpful to our own testing house and to those abroad but it has also enabled advice to be given to manufacturers regarding Continental test requirements.

Of the new tests that have recently been developed the most topical are those in conjunction with B.S. 2612, which



Left: Mechanical endurance test apparatus for electric blankets at the E.D.A. Testing House. Right: Spark ignition equipment for inflammability test. Below : Portable apparatus laboratory

is the basis of the " kite " mark scheme for electric blankets. For example, the roller test which causes a fold to traverse the blanket from end to end is probably well known by now. What is probably not so well known is that this machine was designed in the E.D.A. Testing House after trying other methods in use elsewhere. Many models and modifications were made in the Testing House workshop and large numbers of blankets were tested before the final design was standardized.

Inflammability Tests

Another difficulty that was encountered shortly after the specification was completed was the assessment of the readiness with which materials will burn. The specification requires that materials in contact with heating wires shall be " slow burning " and the difficulty is to be sure of the interpretation of these words. It is, of course, most important that any observer in any testing laboratory will classify any one particular material in the same way, and with slow burning materials this is particularly difficult when the material is ignited by a spirit flame or similar flame source.

To obviate this the Testing House experimented with an alternative method of ignition designed to simulate more closely the fault conditions likely to occur in a blanket. In this, samples of the material are subjected to high-frequency sparks, the sample being maintained at the blanket operating temperature. Experience with a large number of samples showed that materials which the general consensus of opinion had classified as slow burning by the old method, would not ignite at all in the new test. On the other hand, materials which would continue to smoulder or burn after extinction of the sparks would be classified as burning rapidly by the majority of observers using the old method. In this way a simple " go-not go " test was substituted for the flame test with its inferior degree of discrimination.

A somewhat disturbing fact which has been brought to light by the work that the Testing House has been doing on the measurement of the insulation resistance of electric blankets concerns the effect of flame-proofing. A number of manufacturers, having found that their materials have been rejected as burning too readily have resorted to flame-proofing by chemical means. Many of the chemicals used for this purpose are somewhat hygroscopic with the result that when the blanket is exposed to conditions which are humid, yet not excessively so, considering the normal conditions of use, the material becomes, in effect, damped by a salt solution and the insulation resistance falls to a value which is dangerously low.

Some people might argue that the answer to such problems is to use a plastic-coated heater cord, but here the problem is that some plastics lose their plasticizers under high-temperature conditions so that the coating becomes brittle and breaks off, giving a final state which is even more dangerous. Tests for such effects have been devised and are included in the standard, so that it is safe to say that any blanket, whatever its construction, is safe if it passes all the very stringent tests laid down in the specification.

Interference Suppression and Earth Leakage

One of the most interesting problems that is being investigated at the Testing House is one which at first sight seems very simple, namely, the measurement of earth leakage current. It has been noted that on some types of motor-driven appliances fitted with capacitor radio interference suppression units the earth leakage current, when measured with a thermal milliameter, is greatly in excess of the sum of the leakage current from the motor alone and the current through the capacitor network when it is subjected to its operating voltages on a 50 c/s supply independently of the appliance. Investigation has shown that the greatly increased leakage current is due to the generation of voltages of much higher frequency. It appears that in the main the high frequencies are in the audio-frequency range and are caused by commutation. There are, however, radio frequencies also present and the situation is complicated by the fact that as the frequency of a current through the body increases, so the threshold of perception increases.

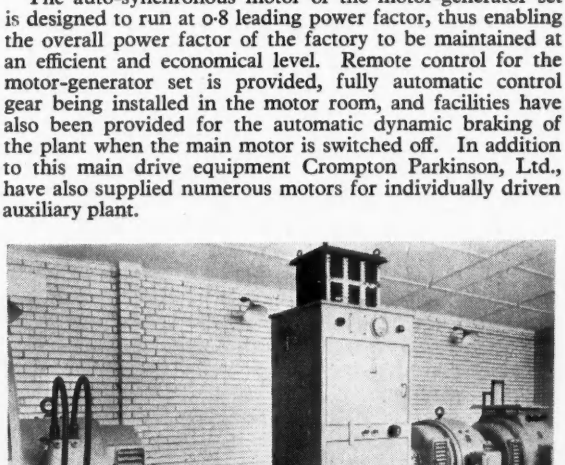
The magnitude of the leakage currents will, of course, not only be affected by the values of the capacitors used but also by their position in the circuit and dealers who may be called upon to deal with offending appliances should be warned that there is very much more to the fitting of radio interference suppression condensers to motor-driven appliances than merely hooking in capacitors that will get rid of the noise.

There are, of course, many other problems being actively considered at the Testing House, particularly those in connection with the development of endurance test machines which will subject an appliance to its normal operating conditions without attention for many days. Enough has, however, been said to show that the E.D.A. Testing House is doing much for the development of safe and reliable electrical appliances.

Plant for South African Factory

For the newly completed cardboard manufacturing factory of South African Board Mills, Ltd., in the Transvaal, Crompton Parkinson, Ltd., have supplied a Ward-Leonard set comprising an auto-synchronous a.c. motor direct coupled to a d.c. generator which in turn controls the 240 h.p. main motor. The Ward-Leonard system was necessary to achieve the high degree of control required. The main motor drives directly the line shaft from which plant in the various sections of the factory are belt driven.

The auto-synchronous motor of the motor-generator set is designed to run at 0·8 leading power factor, thus enabling the overall power factor of the factory to be maintained at an efficient and economical level. Remote control for the motor-generator set is provided, fully automatic control gear being installed in the motor room, and facilities have also been provided for the automatic dynamic braking of the plant when the main motor is switched off. In addition to this main drive equipment Crompton Parkinson, Ltd., have also supplied numerous motors for individually driven auxiliary plant.



The Ward-Leonard set supplied by Crompton Parkinson, Ltd., for installation at the new factory of South African Board Mills, Ltd., Transvaal

Seeking New Materials

Presidential Address to the Institution of Electrical Engineers

THE need for immediate action to produce synthetic substitutes for basic materials used in electrical engineering provided the main theme of Sir George Nelson's inaugural address as president of the Institution of Electrical Engineers last week. Within the past 50 years, he said, the total generating capacity in Great Britain had risen from 1,700 MW to 25,500 MW (in June last). Corresponding figures for the U.S.A. were 6,800 and 121,000 MW. These developments had reduced the cost of electric power in comparison with the cost of living over the past 30 years by more than 45 per cent.

Changes made possible by new techniques were illustrated as shown in Figs. 1 and 2. Similar progress in switchgear had enabled it to deal with increases in voltages from 6 to 400 kV and in interruption ratings from 25 to 10,000 MVA. Such advances had come from the imagination, courage and enormous expenditure on research and development by the heavy electrical manufacturing industry, financed almost entirely from its own resources.

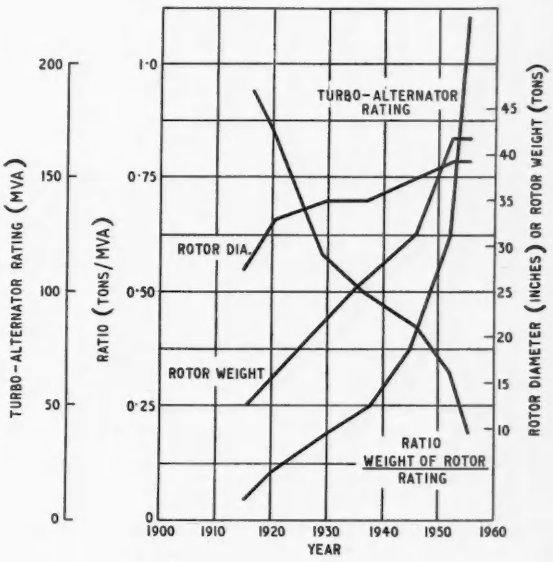
An example of the application of electrical and electronic control was cited in the rolling of sheet steel, which up to 30 years ago was produced from steam-driven mills at about 2·5 m.p.h. To-day, coil lengths of 15 miles left the rolls at nearly 60 m.p.h. Reference was made to the great gains in time and efficiency in research and design problems by the use of electronic computing machines and to progress in telecommunications and broadcasting.

Electricity and Living Standards

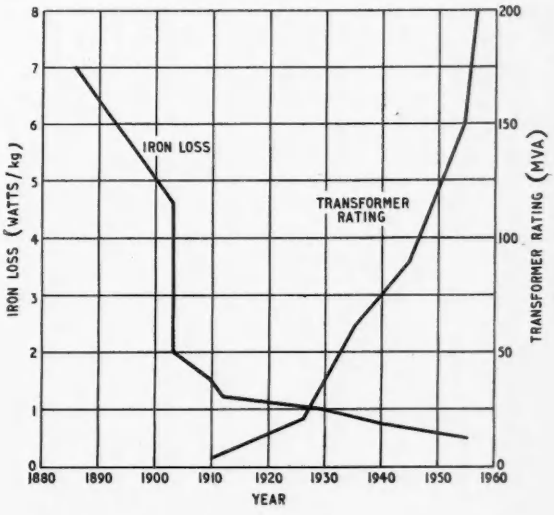
Sir George said he had found a determination among all nations, whatever their stage of development, to improve their standards of living through the application of electricity to their resources, including agriculture, communications and industry. World population had increased from 1,100 million in 1850 to 2,400 million in 1950, and was expected to reach 6,000 million by the year 2050. By the year 2000 the world consumption of energy was estimated to be not less than the equivalent of 7,500 million tons of coal a year—three times the present amount.

The solution to the fuel problem was undoubtedly in sight through the progress made in nuclear development, but intensive research was also necessary to provide alternatives to basic materials. The standard of living of 90 per cent of the world's present population was below that of Great Britain and the United States and if raised to the same level was estimated to exhaust the resources of iron and copper, for instance, in twenty-five years; in probable circumstances the problem of producing synthetic substitutes might easily become acute in a hundred years' time.

Prominent among artificial substitutes were cellulose products, the base of which was the solar energy daily reaching the earth from the sun, estimated to be at least 50,000 times the total energy produced from man-made engines. Terylene fibres had physical properties comparable with steel, indicating the possibility in time of using them for structures, thus conserving iron ore to make steel for its magnetic or other special properties. A synthetic material was now available for making, among other things, pipes for conveying hot, cold or corrosive fluids; this was replacing copper and lead (two materials whose supply



Development of turbo-alternators (above) and transformers (below)



was rapidly diminishing) at a fraction of their prices and with less liability to corrosion.

The field of nuclear physics was also covered by the Institutions of Civil, Mechanical and Chemical Engineers and the Institute of Physics so their association with the Institution of Electrical Engineers in the British Nuclear Energy Conference was of great national importance. It was heartening that the Government was continuing the war-time policy of co-operation with scientists and industrialists in this activity, as the cost of developments could not be borne by individual firms.

Shortage of technical man-power, here and in the

Commonwealth, made it incumbent on the Institution to press for still greater facilities and to continue to advise on methods of education and training for electro-technical scientists and electro-technologists. It was essential to attract a great proportion of young people who might otherwise choose to pursue what are known as " the humanities " and also to influence those who were potentially good but who were taking no steps to carry their education to the graduate standard. The numbers of well qualified teachers of mathematics and science in secondary schools should be increased substantially. The upgrading of certain technical colleges must not be allowed to lower the standards or facilities of others and the demand for quantity of men must on no account mean any diminution in their quality.

A most important aspect was the great and urgent need for technically qualified men having natural gifts for management and highest administration who were familiar with the widest aspects of the business concerned.

Great Britain had very few natural resources and without doubt its scientific, technological and skilled people were its greatest economic asset. They must therefore be employed in the most efficient manner with avoidance of duplication of effort.

Electrical Engineers in Industry

Chairman's Address to the I.E.E. Utilization Section

IN his address on 13th October as chairman of the Institution of Electrical Engineers Utilization Section, Mr. D. B. Hogg surveyed the opportunities, responsibilities and recruitment of professional electrical engineers in industries other than the electrical. This address was in effect supplementary to the papers on electrical engineering as a career which were presented at this year's British Electrical Power Convention and dealt with the supply, manufacturing and installation contracting sections of the electrical industry.

About 80 per cent of all works in Great Britain, he said, employed fewer than 100 persons each and only exceptionally would one of these be a professional electrical engineer. Possibly the total number of professional electrical engineers in these works was 10,000.

Ladders for Promotion

An advantage of working in such main industries, in which electrical engineering was only an adjunct to activities, was association with men in other occupations having different outlooks. A young electrical engineer on joining a large concern could find several ladders for promotion. He would probably start in the engineering department on either design, construction or maintenance, either choosing a career in one of these or moving from one type of work to another for a few years until he found his niche that might lead to the position of chief electrical engineer. In some industries he might transfer to the production side, climbing from plant manager through works manager to production director. With several paths open to advancement he might not need to wait so long for advancement as in purely electrical engineering, but the basic scientific knowledge and training to think acquired in college would never be wasted.

Research departments of large industries often dealt with materials used to build the plants. Guidance was given in design and maintenance on the materials best suited to withstand corrosive, high-temperature or high-pressure conditions.

Complaints by engineers of not being given a higher degree of responsibility or of having schemes turned down were often due to their failure to write a simple clear report explaining why they wished to spend money, giving costed alternatives and showing which scheme gave the better return for the capital involved.

The engineer who fully co-operated with his fellow engineers was worth much to his firm. He should also see that the men responsible to him understood the reasons for the company's regulations and why the plant was built and run in the way it was. The engineer who had kept up-to-date with world practice was able when considering extensions to advise on the choice between a repetition of well-tried and efficient plant and an advance towards higher efficiencies and new techniques, maybe with some risk of development troubles.

Duties of electrical engineers in the design section included: negotiating with the supply authority regarding an adequate power service and tariffs; ascertaining prospective fault current for switchgear; possibly planning a generating station; planning an internal distribution network, providing adequate alternative sources of supply; and deciding on the degree of corrosion to which his equipment was likely to be subjected. He must also be familiar with the Factories Acts, the Electricity Regulations and all relevant statutory requirements and with the I.E.E. Wiring Regulations. He should standardize equipment enough to avoid overstocking his stores and consider better methods of plant control, including automatic. His duties would include the preparation of estimates and reports, and correspondence.

The electrical construction engineer's main duty was to get his plant built to programme at an economical cost while fitting his work in with the civil and mechanical sides. Though usually the last in a building he must not be the cause of the plant starting late. The best order of erection of the electrical gear might have to be subordinated to the mechanical programme, since its share of the capital expenditure was generally less than 10 per cent.

The maintenance engineer had to steer a course between locking up capital for spares and the risk of holding up production because of the lack of some vital component. He should prepare detailed work schedules for routine overhaul months ahead.

University Graduates

A few large firms had for many years trained university graduates in their own works. Their fundamental knowledge and training to think made them more adaptable and carried them more readily to the higher posts at an earlier age. While there would be still ample opportunities for men who had been trained in other and more practical ways, the essential need was for a greatly increased intake of graduate engineers into all industries in order to maintain this country's competitive position.

VIEWS on the NEWS

By REFLECTOR

AT the request of the Minister of Fuel and Power severe cuts are being made in the advertising of the coal, gas and electricity supply industries, as a part of the endeavours being made to curb public expenditure. The Minister (or the Government), of course, has no say in the matter of the advertising of other commodities which may not be so beneficial to the purchaser. The result will probably be a diversion of money to less useful purposes. It is perhaps strange that one of the Gas Boards is still using commercial television but it is said that this is because it has a six-month contract and anyhow it intends to use its time in advertising economical solid-fuel grates and smokeless appliances. There was, I believe, an understanding between the Gas Council and the Central Electricity Authority that the new television service would not be used by either but the Gas Council's powers over the Gas Boards seem to be rather looser than the arrangements prevailing in the electricity supply industry.

* * *

The Oxford Regional Hospital Board has been told by its Finance Committee that hospitals in the region are using too much electricity. One or two hospitals, it is said, used 50 per cent more electricity last year than in the preceding year. The Board has agreed that the matter should be brought to the attention of those concerned " with a view to focusing attention on the need to exercise the utmost economy." It would be interesting to have more information. Hospitals, like other establishments, are naturally using more electricity—indeed electricity is the ideal agent for hospital purposes.

* * *

Two or three weeks ago I mentioned that a speaker at a congress of sanitary officials put the order of preference of housewives for electrical appliances as radio receivers, washing machines, electric cleaners, television sets and refrigerators. I asked where cookers stood. The Midlands Electricity Board, which should know, gives quite a different picture. It says that cookers come first, followed by radio and television sets, washing machines, water heaters, wash boilers and refrigerators. Electric irons are, of course, taken for granted; but where are vacuum cleaners in the M.E.B. list?

* * *

Electricity is frequently the first modern agent to reach remote villages. The nature of gas production and distribution makes it difficult to provide supplies to far-flung areas, although much has been done with bottled gas. There are also distribution problems in conection with piped water supplies. Usually expense is the barrier but with electricity it is more easily overcome as has been proved by the expansion of the system to outlying districts in the past few years. Most villages in Great Britain are accessible by road but even if they are not they can be reached by power lines. A week or two ago this was shown in the case of Riccarton, in Roxburghshire, where a switching-on ceremony was staged. This place is served by a railway but the nearest road ends two miles from it and the approach from that point is over moors and hills. Guests attending the ceremony were advised to use horses if they could and a number of them travelled by this means. It was mentioned at the meeting that the village had been striving to secure a road for twenty-five years; the South of Scotland Electricity Board got there first.

* * *

Some time ago the *Electrical Review* reported the opening of a new maintenance and repair depot at Brighton by the South Eastern Electricity Board. Comment was made on the state of some of the hired appliances taken into the depot for reconditioning; it was obviously an expensive business to put them in order. For years the Board has been trying to persuade consumers with hired appliances to purchase them at extremely low prices, but with indifferent success. Consumers have been afraid (quite understandably) that in assuming responsibility for maintenance they were not on a good thing. Now I read in the *Chatham Observer* that hundreds of consumers in the Medway area are being told that their hired appliances are now their own property and so they will have to look after the equipment themselves. I foresee a heavy demand for new cookers, etc., on hire-purchase terms. There seems to be justification for (but not much hope of) a dispensation from the present hire-purchase restrictions in these cases.

* * *

A study of Alfred Austin, possibly the least distinguished of Poets Laureate, by Norton B. Crowell has just been published. In reviewing it *Truth* reproduces Austin's notorious (alleged) couplet:

" Along the wire the baneful message came,
' He is not better he is much the same '."

I protest: " baneful " should be " electric " and the quotation is from a " poem " inspired by the illness of Edward VII (then Prince of Wales) and not Lord Tennyson as the reviewer suggests.

* * *

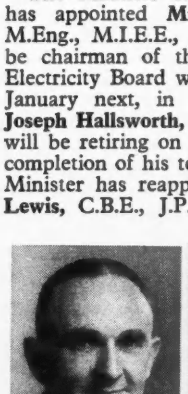
From the *Electrical Review* of 15th October, 1875:—

" In this country the telegraph wires are simply used for the transmission of messages, but to Armenia belongs the honour of discovering that they may be adapted as clothes-lines for laundry purposes. The practice of hanging linen to dry on the wires has lately become general in that country and revealed the hitherto unknown fact that the Armenian peasantry are in the habit of occasionally washing their clothes. Much dismay has, however, been caused by an order that has been issued forbidding the continuance of this arrangement. It seems that the wires have on more occasions than one been broken by awkward washerwomen, and Shefket Effendi . . . who has just been appointed director of the telegraph at Erzeroum, has solemnly declared that no more shirts, stockings, or other garments shall be hung on the wires on any pretence whatever."

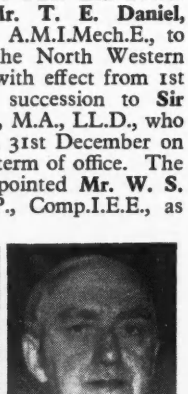
PERSONAL AND SOCIAL

News of Men and Women of the Industry

The Minister of Fuel and Power has appointed **Mr. T. E. Daniel,** M.Eng., M.I.E.E., A.M.I.Mech.E., to be chairman of the North Western Electricity Board with effect from 1st January next, in succession to **Sir Joseph Hallsworth,** M.A., LL.D., who will be retiring on 31st December on completion of his term of office. The Minister has reappointed **Mr. W. S. Lewis,** C.B.E., J.P., Comp.I.E.E., as



Mr. T. E. Daniel



Sir Joseph Hallsworth

chairman of the Midlands Electricity Board and **Mr. J. Mould,** O.B.E., A.M.I.E.E., as deputy chairman of the East Midlands Electricity Board.

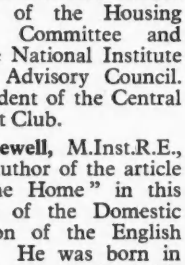
Mr. Daniel has been deputy chairman of the North Western Electricity Board since September, 1953, when he was transferred to that post from the position which he then held as deputy chairman of the North Eastern Electricity Board. Formerly he was borough electrical engineer successively at Ashton-under-Lyne, and then for ten years at Darlington.

Sir Joseph Hallsworth's retirement will complete an outstanding career of service in the trade union movement and nationalized industry. He was for many years general secretary of the Union of Shop, Distributive and Allied Workers, and was president of the Trades Union Congress in 1938-39. He served as a member of the National Coal Board from 1947 to 1949 and was chairman of the Miners' Welfare Commission. He has served as chairman of the North Western Electricity Board since 1949 and in the last two years as one of the Area Board chairmen serving on the Central Electricity Authority.

Mr. Lewis and Mr. Mould have held their present posts since their Boards were first set up eight years ago.

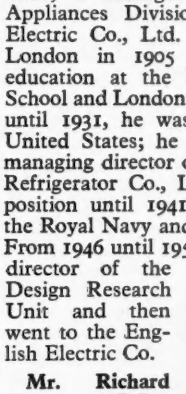
Miss Vera Norvick, who writes on the work of the Electrical Association for Women in this issue, is well known throughout the electrical industry for her work as assistant secretary of the E.A.W.; Miss Norvick has been active in the Association's affairs for twenty-eight years. She was born at Nantyglo, Mon, and after education at the Brynmawr (Breconshire) County Secondary School and taking university extension courses joined the Briton Ferry Steel Co. Later she went to the Hackney Electricity Department. Miss Norvick holds City and Guilds certificates in domestic science and the E.A.W. electrical housecraft diploma. In addition to being assistant secretary of the E.A.W. she is joint secretary of the Caroline Haslett Trust and assistant editor of the *Electrical Age* (the E.A.W. journal). Her other activities include the chairmanship of the Housing Centre Women's Committee and membership of the National Institute of Houseworkers' Advisory Council. She is a past-president of the Central London Soroptimist Club.

Mr. H. C. Timewell, M.Inst.R.E., M.Am.I.E.E., the author of the article on "Equipping the Home" in this issue, is manager of the Domestic Appliances Division of the English Electric Co., Ltd. He was born in London in 1905 and received his education at the University College School and London University. Later, until 1931, he was employed in the United States; he then became joint managing director of the International Refrigerator Co., Ltd. He held that position until 1941 when he entered the Royal Navy and served until 1946. From 1946 until 1951 he was executive director of the Design Research Unit and then went to the English Electric Co.

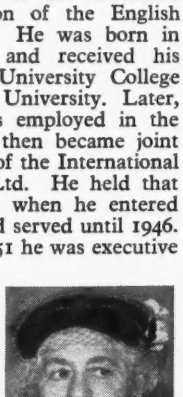


Miss Vera Norvick

Mr. Richard Harvey, B.Sc., A.Inst.P., who describes the activities of the E.D.A. Testing House at Leatherhead on page 760, has been manager of that establishment and its forerunner in London since 1948. Mr. Harvey was born in Islington and attended Holloway School and London University. From 1931 to 1940 he was with the G.E.C. Research Laboratories testing the company's appliances in the heating development laboratory. During the war he was in charge of a small-scale self-contained unit manufacturing cathode-ray tubes for the Services. He returned to the G.E.C. in 1945 when the scope of his work was extended to cover electricity in agriculture. Three years later he took up his present position.

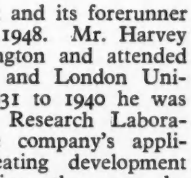


Mr. H. C. Timewell



Mr. R. Harvey

Gent & Co., Ltd., Leicester, have appointed **Mr. C. G. Coulton** as their Birmingham manager. Mr. Coulton, who has been with the company for twenty-eight years, gained experience in its works before being transferred to the commercial side of the business and in 1947 joined the estimating staff. Mr. Coulton has been a Midlands area representative for the past two years.



Mr. C. G. Coulton

The B.B.C. announces the appointment of **Mr. W. A. Roberts,** A.M.I.E.E., as regional engineer, Midland Region, in succession to **Mr. J. A. Cooper,** B.Sc.(Eng.), A.M.I.E.E., who will shortly be retiring from full-time duties after thirty-two years' service with the Corporation.

Mr. Roberts joined the Engineering Division of the B.B.C. in 1937. In 1941, after serving in the London control room and at the Droitwich transmitting station, he joined the headquarters staff of the Superintendent Engineer (Transmitters). In 1945 he transferred to the engineering secretariat and he became assistant to the chief engineer in 1949, and in this capacity represented the B.B.C. on national and international bodies. He held this post until being transferred to the Senior Superintendent Engineer's department in 1951 for special duties. Early in 1954 Mr. Roberts was seconded to the Colonial Office as technical adviser on broadcasting development in the Colonies. He was a member of commissions appointed to advise on the development of broadcasting in the Gold Coast and Kenya. Since returning to the B.B.C.

in May this year, Mr. Roberts has been attached to the Chief Engineer's Department, where his duties have been concerned with the television service. He will be taking up his new duties at the B.B.C. Midland Region headquarters in Birmingham on 1st November.

Mr. Cooper joined the B.B.C. in 1923 at the Birmingham station and became engineer-in-charge in the same year. He became an assistant superintendent engineer in 1934, and after serving in the Scottish and North Regions and in the Superintendent Engineer (Studios) Department in London he returned to the Midland Region headquarters in 1936 as engineer-in-charge of the Birmingham Studio Centre. After military service in the last war, during which he held a commission in the Royal Signals, Mr. Cooper returned to the B.B.C. in Birmingham in 1945 as engineer-in-charge, and took over his present post in 1950.

The following appointments and reappointments as part-time members of Electricity Boards have been made by the Minister of Fuel and Power:—

London Electricity Board.—**Mrs. G. H. Dunbar,** O.B.E., and **Mr. E. A. Mills,** M.I.C.E., M.I.E.E., M.I.Mech.E. (reappointments).

Merseyside and North Wales Electricity Board.—**Mr. H. M. Bibby,** M.Eng., M.I.Mech.E. (appointment).

South Wales Electricity Board.—**Mr. B. Curran,** O.B.E. (reappointment).

Col. A. de Chimay, T.D., A.I.C.E., A.I.Mech.E., a managing director of Prior Stokers, Ltd., has been appointed deputy chairman of the company.

Mr. T. B. Parker, chief rubber technologist, Johnson & Phillips, Ltd., retired on 30th September after fifty-four years' service with the company. Mr. Parker is one of the leading rubber technologists in the cable industry and for a great many years played an important part in the preparation of C.M.A. Specifications, and served on a number of technical committees. He also gave considerable assistance to the Service Departments, particularly the Admiralty, and to the mining industry in the design of special cables. Mr. Parker has been succeeded by **Mr. W. S. Penn,** B.Sc.

Mr. T. B. Parker

Mr. C. A. Cameron Brown, B.Sc., M.I.E.E., agricultural electrification adviser, Central Electricity Authority, and **Mr. J. Gogan,** M.I.E.E., M.S.M.A., chief commercial officer, South of Scotland Electricity Board, were the United Kingdom representatives on the Working Party for the study of rural electrification of the United Nations Economic Commission for Europe (E.C.E.), which accepted an invitation by the Ministry of Agriculture of the Union of Soviet Socialist Republics to spend two weeks in the Soviet Union in order to visit a number of installations. The Working Party consisted of thirty experts from sixteen countries and they first met in Moscow on 26th September. The visit was made as part of the exchanges of technical information recommended by the Economic Commission at its last session. It will be followed in November by a visit of the same Working Party to Austria.

On 1st September **Mr. E. M. Johnson** relinquished his position as chief engineer, Plant Department, Metropolitan-Vickers Electrical Co., Ltd., being appointed consultant to the chief electrical engineer of the company, and **Mr. C. P. Holder,** B.A., M.I.E.E., was appointed chief engineer, Large Electrical Machine Department. On the same date **Mr. H. I. Wood,** B.Sc., A.M.I.E.E., was appointed assistant chief engineer, Turbo-Generator Engineering Department.

Mr. C. P. Holder

Mr. H. I. Wood

Mr. Holder took his degree at Queens' College, Cambridge, later becoming a college apprentice with Metropolitan-Vickers. Subsequently he joined the General Engineering Department and in 1936 transferred to the Plant Engineering Department, since when he has specialized in the design of salient pole a.c. machines. In conjunction with Mr. E. M. Johnson he has read two papers on that subject before the I.E.E., namely, "The Design of Large Vertical-Shaft Water-Turbine-Driven A.C. Generators" (1948) and "The Design of High-Speed Salient Pole A.C. Generators for Water Power Plants" (1952).

Mr. Wood was educated at Kirkwall Grammar School and the Royal Technical College, Glasgow, and received his training as a vacation apprentice with M.-V. After obtaining his degree from Glasgow University and completing his apprenticeship he joined the company's Motor Engineering Department in 1934. Three years later he transferred to the Plant Engineering Department and has been concerned with the design of many large machines in the a.c. turbo-generator section, now the Turbo-Generator Engineering Department.

Sir George Nelson examining the silver jubilee book. With him is Mr. P. Horsfall who made the presentation

To mark his twenty-five years of leadership of the English Electric organization, **Sir George H. Nelson,** Bt., President I.E.E., was presented last Friday with gifts from the employees. These were a set of Georgian silver and a hand-made leather-bound book containing the signatures of over 20,000 employees. The presentation was made by Mr. Percy Horsfall, a director of the English Electric Co., at a gathering of 2,500 employees and their wives at Trentham Gardens, Staffs. Sir George Nelson became managing director of the English Electric Co. at a time of great difficulty but under his guidance it has developed into a strong and comprehensive organization.

In acknowledging the gifts Sir George said that to mark his silver jubilee with the company the directors had agreed to an increase in the pension benefits paid to certain classes of long-service hourly-paid employees of the group and to increase the life insurance of certain categories of hourly-paid workers. A hand-made visitors' book was presented to Lady Nelson.

Mr. D. J. Bolton, whose retirement from the Central Electricity Authority was announced in our issue of 26th August, is going to Venezuela for Kennedy & Donkin to report on the electricity tariffs of the Caracas undertaking. He will be away for about six weeks.

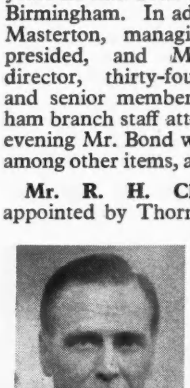
Following the recent appointment of Mr. Richard McCullough as managing director of Lumenated Ceilings, Ltd. (a subsidiary of Thermotank, Ltd.), the company announces two further board appointments. **Mr. I. D. Cameron,** who has joined the board as technical director was previously technical manager, a position he has held since the company's inception last year. **Mr. Donald McCullough** has also joined the board.

At the recent annual general meeting of the National Smoke Abatement Society **Sir Ernest Smith,** C.B.E., the retiring president, was unanimously invited to continue in office for a further

year, in view of the death of the president-elect, Lord Horder. Sir Ernest accepted the invitation.

A dinner was given to the directors of Brown Brothers, Ltd., on 12th September at the Queen's Hotel, Birmingham, to bid farewell to **Mr. H. S. Bond,** who was retiring after nearly half a century's service with the company, of which for over thirty years he had been branch manager in Birmingham. In addition to Mr. J. T. Masterton, managing director, who presided, and Mr. K. Comport, director, thirty-four representatives and senior members of the Birmingham branch staff attended. During the evening Mr. Bond was presented with, among other items, a television set.

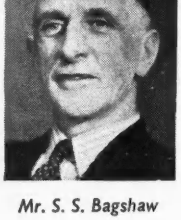
Mr. R. H. Church has been appointed by Thorn Electrical Industries, Ltd., as area sales manager, Scotland. Mr. Church is well known in the lighting industry, having served with the Philips organization from 1929 to 1939. Before 1930 Mr. Church served in the Merchant Navy, and from 1939 to 1945 held an executive commission in the Royal Naval Reserve. After the war he formed his own company and was responsible for the design and manufacture of decorative and commercial fluorescent lighting fittings, including fluorescent units for fast moving fighting vehicles.



Mr. R. H. Church

Mr. H. C. Spence, M.I.E.E., M.I.Mech.E., deputy chief engineer, London Electricity Board, will be retiring at the end of November after forty-three years' service in the electricity supply industry.

Mr. S. S. Bagshaw retired from the staff of the Publicity Department at the end of September, after thirty-six years' service with the British Thomson-Houston Co., Ltd. He joined the company in 1919 and superintended the art section for many years. During the war he became chief assistant, Press advertising section.



Mr. S. S. Bagshaw

Sir Charles Westlake, who relinquished the chairmanship of the Uganda Electricity Board at the end of last month, has recently been the guest of honour at a number of farewell gatherings in Uganda. At one of them, a dinner at the Lake Victoria Hotel, Entebbe, the company included the Governor of Uganda, Sir Andrew Cohen, and Lady Cohen, and other leading personalities in Uganda including Sir Charles Westlake's successor, Mr. W. D. D. Fenton, and Mrs. Fenton. At the dinner Sir Charles was presented with a morocco bound set of the "Encyclopædia Britannica" from the Board itself and a clock from individual members of the Board. Sir Charles is taking a short holiday at the coast before leaving for England. He was recently appointed a director of Metal Industries, Ltd.

Mr. E. P. Peel, A.C.A., relinquished the position of secretary to Joseph Sankey & Sons, Ltd., on 5th October after 34 years with the company; he is remaining on the board. **Mr. R. H. Pearson,** A.C.A., chief accountant and assistant to Mr. Peel, has been appointed secretary of the company.

Mr. J. McLellan, B.Sc., has been appointed sub-area engineer in the Northamptonshire Sub-Area of the East Midlands Electricity Board in succession to **Mr. G. C. Benson,** who has retired after forty years' service in the electricity supply industry. Mr. McLellan, after service with the Yorkshire Electric Power Co. and Pirelli-General Cable Works, Ltd., became construction engineer with the Northampton Electric Light & Power Co. in 1936 and technical engineer in 1941. Since 1950 he has been assistant sub-area engineer at Northampton.

Mr. W. E. Warrilow, M.I.E.E., F.J.I., and Mrs. Warrilow, who left in April last year on a visit to one of their daughters in Hamilton, New Zealand, have recently returned home. Their present address is 204, Manor Way, Aldwick Bay, Bognor Regis (Pagham 7267).

Mr. J. E. Gaffney, late works manager with J. H. Tucker & Co., Ltd., informs us that he has now left their employment. His private address is 25, Ashurst Road, Walmley, Sutton Coldfield.

About 850 employees and friends attended the "open" day of **Asea Electric, Ltd.,** on 1st October. The visitors passed along marked routes through the offices and works, and at numerous points machines and operations were demonstrated. In the Test Department, surge generator equipment was demonstrated and a small model house was used to show electrical discharges of one million volts. A tea buffet was available for visitors in a cleared area in the new transformer bay.

The Electrical Industries Benevolent Association announces that all tickets for the **Electrical Industries Ball** on Friday, 11th November, at Grosvenor House, have been sold.

The speaker at last Tuesday's luncheon of the **Electrical Industries Club** was Capt. P. P. Eckersley, who was the first chief engineer of the B.B.C. and in the earliest days of broadcasting an announcer and entertainer as well as engineer. Capt. Eckersley's address was in his characteristic style and his reminiscences and views on broadcasting were amusing and stimulating, particularly when he was dealing with "independent" television.

OBITUARY

Mr. W. J. Rawlings.—We regret to report that Mr. William J. Rawlings, chairman of Rawlings Brothers, Ltd., building and electrical contractors, collapsed and died at a luncheon on Monday last. Mr. Rawlings was the son of Mr. W. R. Rawlings, the first president of the Electrical Contractors' Association. He was a director of a number of other companies including the Rawlplug Co., Ltd. He was sixty-two years of age.

Mr. P. F. Deakin.—The death occurred on 7th October of Mr. Percy Frederick Deakin, late works director of Enfield Cables, Ltd. Mr. Deakin was educated at the East London Technical College (now Queen Mary College) and joined Enfield Cable Works, Ltd., as a draughtsman in 1919. He became manager of the copper wire mill in 1923, and developed the copper rod rolling mill in 1926. He was appointed works manager of Enfield Cable Works, Ltd., in 1932 and works director in 1943. In December, 1951, he was compelled by ill-health to retire from active business, but remained on the board of the company as a part-time member until he finally retired in January, 1953.

The late Mr. P. F. Deakin

Mrs. J. F. Stanley.—We learn with great regret from Mr. J. F. Stanley, assistant technical director of the British Standards Institution, that his wife died on 9th October after a short illness. Mrs. Stanley was very well known at home and abroad; she took a prominent part in entertaining the ladies who attended the I.E.C. meetings in London this year.

WILLS

Mr. J. C. M. Matthews, M.I.E.E., formerly for many years chief electrical engineer to the Malay States Government, who died on 30th June last, left £2,331 gross (£2,275 net).

Mr. W. C. Gratton, who was on the managerial staff of Pirelli-General Cable Works, Ltd., and who died on 7th June, left £6,267 gross (£4,334 net).

Mr. L. F. A. Fogarty, M.I.E.E., managing director of the Zenith Electric Co., Ltd., who died on 9th July last, left £52,353 gross (£46,310 net).

Mr. C. P. Lockton, chief engineer of Chloride Batteries, Ltd., who died on 20th February last, intestate, left £7,540 gross (£4,095 net).

Mr. A. R. Dunston, M.I.E.E., for many years a research engineer with the Metropolitan-Vickers Electrical Co., Ltd., who died on 12th June last, left £11,764 gross (£11,608 net).

INDUSTRIAL NEWS

E.I.B.A. President's Appeal

Sir Harold Bishop, president of the Electrical Industries Benevolent Association, has issued an appeal in which he says that the dominant need is for more regular subscribers to the Association. He states that last year it helped financially, and in other ways, 1,177 people. Adding in their wives, children and other dependants, the number was nearly 2,000, or 10 per cent more cases than in the year before. As a result, the money grants made by the Association in the year increased by more than £4,000 over the previous year's total, and the sums spent in helping beneficiaries in other ways also rose considerably. The Association's voluntary income, however, increased by only £2,459.

Sir Harold appeals for that additional effort on the part of the Association's many friends without which, he says, the Association cannot hope to meet the mounting and urgent claims made upon it. He concludes his appeal with the following: "We who are fit and able must see that we keep pace with the ever increasing demands on the help of the E.I.B.A."

L.C.C. Lift Contract

The Express Lift Co., Ltd., has received a further contract for 150 passenger lifts for housing estates, each capable of carrying eight persons, from the London County Council at a cost of £386,020. In value it is believed to be the largest lift contract ever awarded in this country.

Ninety-eight of the lifts will have automatic push button control. Thirty-six will have full automatic collective control and sixteen others will be interconnected in pairs and have the same fully automatic collective control. In all lifts the operation of the car and landing doors will be completely automatic. The whole of the equipment for the lifts, with the exception of the motors which will be manufactured by the parent company, the General Electric Co., Ltd., and the tee steel guides and steel wire ropes, will be made at the company's Abbey Works, Northampton.

Training Spanish Engineers

A party of thirteen Spanish engineers arrived in this country by air on 5th October to commence a six months' course of training with the Metropolitan-Vickers Electrical Co., Ltd. This special arrangement follows the placing with Metropolitan-Vickers of a large contract for steam power station generating equipment for the Instituto Nacional de Industria. As announced in January of this year, this contract was for six turbine-generator sets and associated equipment, for installation in five different power stations, and a supplementary order for a further 15 MW set brings the total value of the contract to £2,300,000.

Commissioning of the equipment is planned to start in the early part of 1957, and the trainee engineers are being prepared for its operation in service. They will occupy positions ranging from chief engineer to turbine attendant. Divided into two groups, they will spend half of the training period at Trafford Park and the remainder with the company's erection engineers on various sites where M-V equipment is being installed. Upon the completion of the course, a further party of engineers of about the same number will come from Spain for similar training.

Such training courses are becoming a recognized feature of the company's overseas contracts, similar arrangements having been made for the training of Turkish engineers concerned with the Catalagzi power station extensions, where Metropolitan-Vickers turbine-generators are at present being installed.

Board's Men Go Slow

At a meeting of Labour women last week Mr. N. Dodds, Labour M.P. for Erith and Crayford recounted his observation of a party of men employed by the London Electricity Board on work just outside his Dartford home. He said that they started at 8 a.m., when 7.30 was the proper time, there was some leisurely digging then and after a tea break at 9.30. At 10.15 the men rested on their shovels and at 11.15 they broke off to sample a snack of apples which arrived on the site. One young man's sole function appeared to be the making of tea. Mr. Dodds said that men who took things as easily as this were robbing the people; he had written to the L.E.B. calling for a full investigation.

Mr. H. J. Randall, chairman of the L.E.B., later said that he was quite prepared to accept Mr. Dodds' statement as correct; a small minority of the Board's employees undoubtedly lazed over their work and indulged in restrictive practices. Six men were sometimes sent to do a job which two men could handle with corresponding extra expense. The Board had to accept this; it was imposed on them by the unions concerned.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £171 0s 0d
COPPER, H.C. Electro	ton £346 0s 0d
Fire Refined 99·70%	ton £345 0s 0d
Fire Refined 99·50 %	ton £344 0s 0d
COPPER Tubes ..	lb 3s 4d
Sheet	ton £413 10s 0d
H.C. wire and strip ..	ton £387 10s 0d
LEAD, English ..	ton £106 10s 0d
Foreign	ton £105 0s 0d
MERCURY	flask £92 0s 0d
TIN, block (English) ..	ton £756 10s 0d
ZINC, G.O.B. Foreign	ton £90 5s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 2s 7¾d
Sheet	ton £326 5s 0d
Wire	lb 3s 3¾d
PHOSPHOR BRONZE Wire	lb 4s 10½d
PLATINUM	oz £29 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 36¾d—36¼d

Asea Extension

Asea Electric, Ltd., recently acquired the factory property in Fulbourne Road, E.17, situated immediately opposite the main works and previously occupied by the Barnet Ensign Co., Ltd. These premises are now known as the Asea West Works and part of the first floor has been completely redesigned and redecorated to accommodate the design and drawing offices. The new plan of offices has necessi-

The new design and drawing offices of Asea Electric, Ltd.

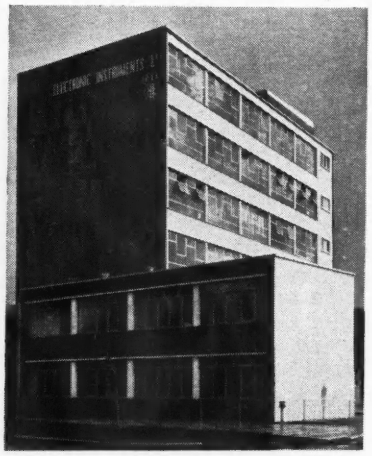
tated many structural changes and particular attention has been paid to the requirements of good natural and artificial lighting, heating and ventilation. The lighting consists of G.E.C. fluorescent reeded "Perspex" fittings and the installation was carried out by Asea electrical staff.

Signal Generators for Sweden

Marconi Instruments, Ltd., in conjunction with Svenska Radioaktiebolaget, has obtained a contract for signal generators from the Royal Swedish Air Board valued at £23,000. The contract was secured in the face of severe competition, especially from America. Covering a range of 12 to 425 Mc/s, the new amplitude-modulated generator has a calibration accuracy of 0·5 per cent.

New Instrument Factory

On 4th October the new factory of Electronic Instruments, Ltd., at Richmond, Surrey, was officially opened by



The new six-storey factory of Electronic Instruments, Ltd., at Richmond, Surrey

the Earl of Halsbury. The factory is a good example of contemporary design, being built on six floors with large windows on both sides. The top two floors are staffed by operatives engaged in all phases of assembling and testing the wide range of instruments made in the factory.

On the floor below is the meter department where precision meter movements are made. Beyond this is the development laboratory and the chemistry laboratory devoted to pH research. The building also houses a machine shop, drawing offices, glass blowing department and offices, with an attractive club room to complete the pattern. The whole factory is protected by the "Minerva" nuclear smoke detection system, a product of an associated company, which has been adopted by the Air Ministry for the protection of the radar network.

The products of the company fall into several groups. Perhaps the most important of these is pH measurement, and the company claims to have introduced the first successful direct reading meter of this type on the British market. Other instruments include high and low range resistance measuring devices, precision milli-second timers and nucleonic weight controllers. Since its inception the company has pursued a policy of making only those instruments which have not previously been available and for which an obvious need existed.

M.-V. Electronics Department

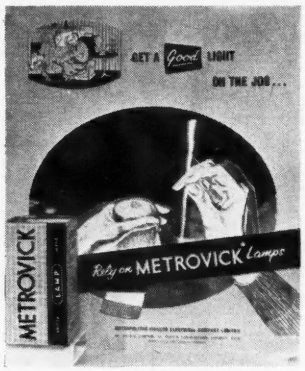
In order to co-ordinate further the interests of various departments concerned with electronics, the Metropolitan-Vickers Electrical Co., Ltd., has transferred the Industrial Process Control Engineering Department to the recently formed Electronics Department. Mr. R. H. Kelsall, B.Sc., A.M.I.E.E., formerly assistant chief engineer, Industrial Process Control Department, becomes assistant chief engineer (Industrial Process Control), Electronics Department. This section is concerned with the industrial application of closed loop control systems in all its forms, including electronic and magnetic amplifiers; the use of computers and associated techniques in conjunction with control systems will also be within its field.

Lamp Publicity

The "Metrovick" autumn publicity campaign includes large-scale advertising for lamps and lighting in the dealer and electrical Press and architectural, engineering, municipal, shipping and textile trade magazines. A number of business journals which circulate to executives have also been used. The lighting advertising is based on the slogan "Lighter overheads," while lamp advertising is on the theme "Get a good light on the job." Display material includes a 12in by 15in cut-out showcard and a 29in square three-dimensional self-illuminating centre-piece in colour. Special window dressings are available.

There will be extensive advertising in the electrical and dealer Press for "Ediswan" lamps and lighting as part of the Edison Swan Electric Co.'s autumn publicity campaign. New display items include a novel "tripod" lampholder for counters and windows, and a self-illuminating display designed for standard window dressing. For larger windows and permanent displays a 15in square "peg board" display piece has been produced to hold various types of lamps. A new self-adhesive window sticker has also been introduced, and special "Ediswan" lamp and lighting window dressings are also available.

"Ediswan" Tripod lampholder for counter and window display



"Metrovick" cut-out showcard illustrating the slogan "Get a good light on the job"

Transformers for Canada

Ferranti, Ltd., have been awarded a further order by the Aluminum Co. of Canada, Ltd., for three 71,000 kVA, single-phase generator transformers stepping up to 301,400 V. These units will form the second 213,000 kVA bank of generator transformers to be supplied by the company for installation at the Alcan project at Kemano, British Columbia. The transformers will have aluminium windings, and it is believed that they will form the largest bank of transformers with aluminium windings in the world. This order brings the total number of transformers supplied or under construction by Ferranti, Ltd., for the Alcan project to thirteen units of a total capacity of 648,000 kVA.

Works Rail Link

Following a public inquiry last June, the Ministry of Transport has approved the construction of a light railway across Shields Road, Newcastle-on-Tyne, to connect the existing works of C. A. Parsons & Co., Ltd., with a new factory to be built for the Nuclear Power Plant Co., Ltd. When an inquiry into the crossing scheme was held it was stated that a rail crossing was essential to carry large plant and equipment between the works. The Ministry of Transport has limited the times at which the crossing can be used. The site of the proposed new factory has been cleared and work has commenced on the foundations.

M.E.M. Acquisition

The Midland Electric Manufacturing Co., Ltd., announces that it has purchased the whole of the share capital of J. H. Tucker & Co., Ltd., of Tyseley, Birmingham. The pur-

chase has been financed out of the current resources of the Midland Electric Manufacturing Co. The newly acquired company, originally established in 1892, is one of the oldest engaged in the manufacture of electrical wiring accessories, and includes a subsidiary, the Kersons Manufacturing Co., Ltd., also producing a similar range of products. Mr. J. B. Tucker, chairman and managing director, has agreed to remain on the board of J. H. Tucker & Co., Ltd., until the end of this year to assist in the transition, and Mr. J. C. H. Tucker has been appointed general manager, with a seat on the new board of J. H. Tucker & Co., Ltd.

Window Dressing Competition

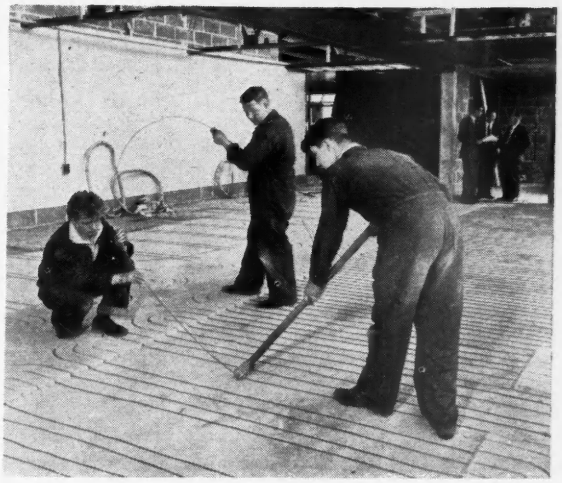
L. G. Hawkins & Co., Ltd., have sent us a copy of their new catalogue and a broadsheet giving details of their "selling carnival" and window dressing competition. The competition is being held from 24th October to 5th November and prizes of £100, £50 and £25, with twenty other smaller prizes, are offered to dealers with the best dressed windows showing the Hawkins range of household products. The competition is being backed by an extensive advertising campaign. The catalogue contains large clear illustrations of the company's products, with all the information that the trade buyer is likely to need.

Electro-Medical Equipment for China

A large order for electro-medical equipment for installation in the General People's Hospitals in Hsinwa, Tientsin and Hsiehho-Peita, Peking, has been obtained by the Edison Swan Electric Co., Ltd., in the face of strong foreign competition. The order covers electro-encephalographs (brain machines) with spares to the value of over £15,000 and brings the total value of this type of equipment sold to China since 1947 to over £25,000.

Lighting Conferences for Architects

The Lighting Service Bureau is reviving the annual series of conferences for architects which have been suspended since before the war. This year's series will be held at the Bureau, 2, Savoy Hill, London, W.C.2, on the evenings of 20th and 27th October and 3rd November. In planning the programme the Bureau has had the help of Sir Hugh Casson, Walter Goodesmith, C. S. White and F. R. Yerbury, O.B.E. These well-known architects have also agreed to advise the Bureau on subsequent conferences. The first of the series will deal with the use and abuse of modern electric lamps, the second planning to achieve a desired lighting effect, and the third the appearance of lighted objects and surfaces.



Laying floor warming cable at Burton & Deakin's new showrooms

Garage Floor Warming System

An electric floor warming system is a notable feature of the new showrooms of Burton & Deakin, Ltd., Orpington, Kent, agents for automobiles and distributors of "Exide" and "Drydex" batteries, opened on Wednesday last.

The showrooms have a frontage of 60ft and extend back 30ft to abut on an existing workshop with which they communicate. The floor warming system covers an area of 1,440 sq ft. Pyrotenax mineral-insulated cables of 0·0015in cross-sectional area are laid direct into the concrete screed of the floor, 4in apart, constituting three single-phase circuits each of 7·2 kW and 1,272ft in length. The installation is thermostatically and time-switch controlled and operates only at night off-peak hours.

The installation was designed and carried out under the supervision of Mr. T. Waterhouse, assistant commercial engineer of the West Kent District of the South Eastern Electricity Board; the district manager, Mr. P. S. Watson, M.I.E.E., is one of the pioneers of this system. To conserve heat as much as possible and thereby still further economize in electricity, full use has been made of insulating materials, including double-glazed "Insulight" windows made by Pilkington Bros.

Danish Atomic Reactors

The Danish Atomic Energy Commission is working on plans to build the first Danish experimental atomic station on the shores of Roskilde Fjord in Zeeland. It is estimated that the station will cost about 100 million kroner (£5 million) to build and about Kr.10 million per annum to run. The station will house two reactors which will be built with British and American assistance.

East African Electrical Trade

There is a small but steady demand for all types of domestic electrical apparatus in Portuguese East Africa. This is stated by Mr. B. T. M. Nairn, H.M. Consul General at Lourenço Marques, in his report on the economic and commercial conditions in Portuguese East Africa (H.M. Stationery Office, 2s 6d). The demand is confined mainly to the non-native element of the population. The

Delegates at a dinner held on 29th September at the Waldorf Hotel, London, in connection with the recent Enfield Cables home sales conference. The chairman of the conference was Mr. R. Bate, sales director

annual rate of building is estimated at about 350 houses, offices, etc., which should provide a slight yearly increase in the intake of these products. Hydro-electric schemes and other developments are creating a greater demand for heavier types of equipment. In 1953 the largest supplier was the United Kingdom with about 29 per cent of the whole. The report briefly outlines the irrigation and hydro-electric schemes in hand or envisaged.

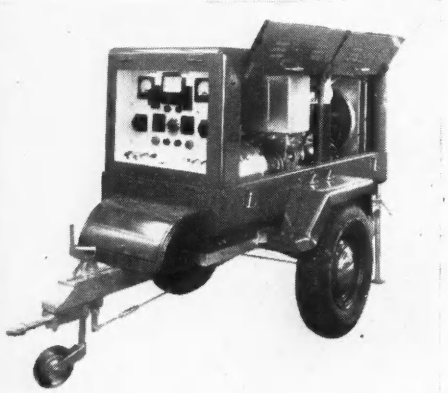
Steelworks Overhead Cranes

The British Iron and Steel Research Association has prepared a specification for heavy duty electric overhead travelling cranes for use in iron and steel works, revising that issued in May, 1950. An attempt has been made to reduce the costs and weights of these cranes and the wording is simplified so that the purchaser will be supplied with special equipment or features only if these are separately requested. Crane duties are required to be defined more closely.

The document covers all aspects of travelling cranes including drive and control gear, collectors, cables, earthing and lifting magnets. It should be useful to all crane purchasers and not only to those in the steel industry. Copies are obtainable from the Information Officer, B.I.S.R.A., 11, Park Lane, London, W.1, price 10s to non-members.

Mobile Generating Plant

Just over twelve months ago the power division of Clarke-Built, Ltd., supplied a mobile generating plant to the special order of Marconi's Wireless Telegraph Co., Ltd., which was used to supply power to a television broadcasting unit in the Eurovision link-up for the world football cup. The performance of this 15 kVA plant was so satisfactory that a further order for three mobile generators has been placed with Clarke-Built by Marconi's. The first is now in service with the Independent Television Authority, whilst the remaining two will shortly be shipped to Russia where they will be used with the outside broadcasting units of the State television service.



A mobile generating plant supplied by Clarke-Built, Ltd., to Marconi's for use with a television outside broadcasting unit

Form Design

Although the Civil Service has always been the butt for jokes on the filling of forms, actually industry and commerce produce forms in far larger quantities. However tiresome these may sometimes seem, this method is still the only way of collecting and passing on information in a concise way. Forms, however, should be properly designed to avoid inefficiency and irritation, and to assist executives in the preparation of forms, the Office Management Association has published a book "Form Design," based on a report produced by an organization and methods study group of the Association. This deals with design in relation to the use of the form, covering such matters as form size, the arrangement of entry spaces and copying entries, while a chapter on design in relation to the production of the form includes information for the printer, drafting and specification. The book is obtainable from the Association, 58, Victoria Street, London, S.W.1, price 6s.

Pass-out Turbine for Paper Company

The General Electric Co., Ltd., has received an order for a 4,500 kW pass-out turbo-alternator set from the Westfield Paper Co., Ltd., Bathgate, West Lothian. The 3,000 r.p.m. direct-coupled machine will be provided with a Hick Hargreaves surface condensing plant. The alternator is of the closed ventilated type, generating at 3,300 V and is designed for operation at a power factor of 0·8. The consulting engineers for the installation are J. D. Crozier & Partners, Ltd.

B. & W. at Indian Industries Fair

Babcock & Wilcox, Ltd., will be prominently represented at the Indian Industries Fair, New Delhi, 29th October to 12th December. The stand, which will have an area of some 2,500 sq ft, has been designed in the United Kingdom by Mr. W. G. Monk, of the company's Publicity Department, and will emphasize the long connection of the company with India, photographic enlargements being widely used. One of the full-size exhibits will be a pair of "Oldbury" chain grate stokers suitable for Lancashire or Economic shell type boilers and a number of scale models of boilers, furnaces, stokers, etc., will be exhibited.

New E.A.W. Branch

The inaugural meeting of the Bath and District Branch of the Electrical Association for Women was held at the Pump Room, Bath, on 4th October. The meeting was opened by Councillor Miss Kathleen M. Harper, O.B.E., J.P., who is to be the first president of the Branch. Mr. S. F. Steward, chairman of the South Western Electricity Board, addressing the meeting, said that he thought the E.A.W. could help, not only by spreading knowledge of the electrical way of life, but also by being keenly critical of anything they felt was hampering progress. Miss N. Baker, M.B.E., Branch Development Secretary, from headquarters of the E.A.W., spoke on the objects and aims of the Association, after which Miss E. B. Neilson, principal of the City of Bath Training College of Domestic Science, gave a short address.

Accident Prevention Conference

On 28th October the London Industrial Co-ordinating Committee, which is affiliated to the Royal Society for the Prevention of Accidents, is holding a one-day conference in Guildhall in the presence of the Lord Mayor of London, supported by Sir Walter Monckton, Minister of Labour and National Service, Sir George Barnett, H.M. Chief Inspector of Factories, and Sir Howard Roberts, president of the Royal Society for the Prevention of Accidents. Sir Ewart Smith, deputy chairman, Imperial Chemical Industries, Ltd., and chairman of the British Productivity Council, Mr. A. E. Amor, deputy managing director of Kodak, Ltd., and Mr. P. E. Trench, managing director, Bovis, Ltd., will speak on various aspects of accident prevention related to production.

Electricity Supply Wage Claim

It was announced last week by the National Union of Enginemen, Firemen, Mechanics and Electrical Workers that it was asking the trade union side of the National Joint Industrial Council for the Electricity Supply Industry to examine the advisability of proceeding with a claim for a substantial increase in wage rates for manual workers in the industry. The union has about 18,000 members in the electricity supply industry.

I.E.E. Membership

A new edition of Part I of the membership list (corporate members and companions) has been published by the Institution of Electrical Engineers. Non-members may obtain copies from the Institution, Savoy Place, London, W.C.2, at 7s 6d each.

Manchester Association of Engineers

The offices of the Manchester Association of Engineers are now at 18, Booth Street, Manchester, 2 (telephone: Central 1717).

Trade Announcement

The London office of **Lumenated Ceilings, Ltd.,** is now at Alliance House, Caxton Street, London, S.W.1 (telephone: Abbey 7113).

Power Supply in Ontario

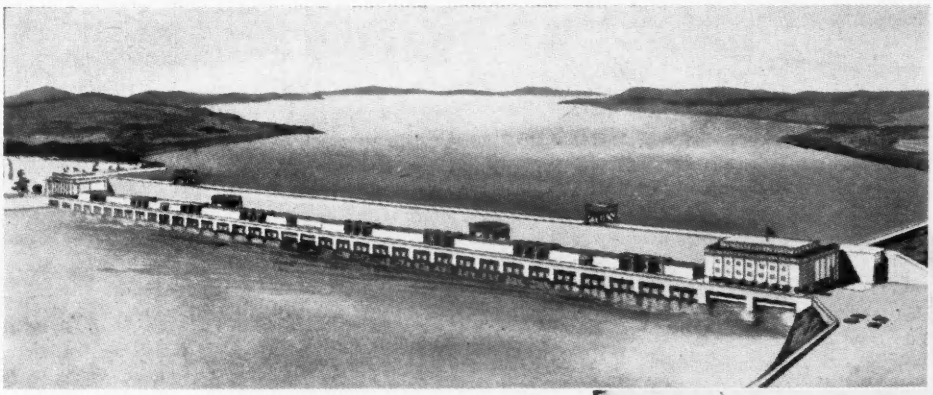
NEW CONSTRUCTION PROVIDES MARGIN OF RESERVE

FAVOURABLE water conditions and the bringing into service of the Sir Adam Beck-Niagara No. 2 generating station provided the Hydro-Electric Power Commission of Ontario with a reasonable margin of reserve capacity in 1954 for the first time for many years. Its report for the period, just received, shows that at the end of the year the dependable peak capacity of the Commission's systems was 4,135 MW, an addition of 570 MW compared with 1953, and the output of its 65 hydro-electric and six fuel-electric stations rose by 11·2 per cent to 18,078 million kWh. Purchases (4,309 million kWh) were slightly less than in the preceding year and the net output to the Commission's 1,467,000 consumers, served directly or indirectly, increased by 7 per cent to 22,386 million kWh. Capital expenditure during 1954 amounted to $133 million, of which about 58 per cent was on generating facilities. Gross revenue rose by 7 per cent to $147 million.

Officially opened by the Duchess of Kent on 30th August, 1954, the Sir Adam Beck station is the largest to be constructed in the history of the Commission. At the end of last year seven 75 MW sets were in operation and this year a further five units are scheduled to be in service, making 900 MW in the main station. An additional 170 MW will be available in 1956-57 from a pumped storage scheme and provision has been made for four more 75 MW units in the main generating station as required, so that the ultimate capacity will be 1,370 MW. The estimated cost is $343·7 million (£125 million). The pumped storage scheme, begun in 1953, will make use of reversible units to pump water from the power canal into a reservoir during off-peak periods and at times of high demand to operate in reverse as turbo-alternators.

The year also saw the start of work on another scheme of considerable magnitude, the St. Lawrence power project —a separate undertaking from the St. Lawrence Seaway— which is being built by the Ontario Commission and the New York State Power Authority and is subject to the approval of a joint board of engineers appointed by the Governments of Canada and the United States. The Canadian share, the Robert H. Saunders-St. Lawrence generating station, is being constructed by the Ontario Commission on the international section of the river near Cornwall. It will have an installed capacity of 820 MW in sixteen units, with a rated head of 81ft, and is scheduled for operation in 1958-60. The main features include two adjoining power houses, an integral part of a gravity-type dam structure, together with two control dams, and dykes to contain the head-pond. The power house structure, bisected by the international boundary, will span the north channel of the river between Barnhart Island and the Canadian mainland at the downstream end of the island. At the upstream end, the Long Sault dam will span the south channel and will control the level of the head-pond, while a dam at Iroquois Point will regulate the flow from Lake Ontario. The gravity dam incorporating the power houses will be 3,250ft in total length and will have a maximum height of 160ft above the foundation. So far as the Commission is concerned, the power house structure, of the modified outdoor type, will be novel in design. As in the United States power house, the generating equipment will be protected only by removable housings, and the conventional superstructure will be confined to the erection bay at the shore end. The cofferdams to de-water the power house site were well under way at the end of 1954 and construction of the main features of the project has since begun.

Other power developments carried out by the Commission last year included the addition of two units at the Pine Portage station on the Nipigon River, completing that station (peak capacity 118 MW). Good progress was also made with the Manitou Falls scheme on the English River. Early in the year the Commission was temporarily deprived



Architect's sketch of the St. Lawrence project and (below) early construction work showing the upper coffer dam to span the north channel between Barnhart and Sheek islands

of the output of the Richard L. Hearn steam station owing to mechanical failure.

After five years' work on the frequency standardization programme the Commission has converted the services of 421,470 consumers from 25 to 60 c/s and has also standardized the equipment of 66,528 consumers who have moved into the 60 c/s area. At the time of the primary peak demand in December last 65 per cent of the requirements in Southern Ontario were for 60 c/s power against 55 per cent a year before. Although endeavours are being made to reduce the cost of standardization by economical techniques, the increased number and variety of frequency-sensitive appliances and rise in costs are resulting in a substantially higher expenditure.

In 1954 a total of 18,651 million kWh of primary power was supplied to 375 municipalities, 188 direct industrial consumers and 105 areas in the rural power district. Supplies to industry, at 6,361 million kWh, were 3·7 less than in 1953 owing to a 33 per cent reduction in purchases by the steel and electro-metallurgical industry. Municipalities took 10,684 million kWh (8·7 per cent increase) and rural power districts 1,606 million kWh (12·3 per cent increase).

Considering the future, the Commission's chairman (Mr. R. L. Hearn) says that with the development of the last major hydro-electric site in Southern Ontario (the St. Lawrence project) the possibility of generating electric power by nuclear reactors, using fuels which are available in abundance in Canada, assumes increasing importance. Studies conducted by Atomic Energy of Canada, Ltd., have resulted in the initiation of a project to construct a small plant near the Des Joachims generating station to feed into the Southern Ontario system. In this, the Commission and the Canadian General Electric Co., Ltd., are actively participating.

The Commission's report contains a tribute to the late Mr. R. H. Saunders, C.B.E., Q.C., chairman from 1948 until his death following an aircraft accident in January last.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Fair Trading

IT was nearly three years ago that, at the Electrical Contractors' Association Conference in Bournemouth, I made what I then thought—and still do think—a reasonable appeal for the proper implementation of the Fair Trading Policy.

Since then the Policy has been defined in terms which appear to be somewhat more equitable to contractors; but of what use is a policy unless it is implemented in accordance with the (presumed) intentions of the parties concerned? Surely it was not the intention that the discount entitlements clearly specified should be communicated by the manufacturers over the telephone to anyone claiming a name or status which they may or may not possess—and yet this has been done to my knowledge by one of the largest and most insistent claimants to being fair trading supporters.

Perhaps the most serious, and I think sinister, practice in the fair trading structure is the readiness of manufacturers and wholesalers to accept the report of a traveller concerning claims made by firms who are anxious to cash in on electrical trade discounts. It seems sufficient that some relatively junior employee should say to this traveller: "Oh yes, we have our own electrician," and back goes a report enabling an attractive quotation to be sent giving away some of the contractor's profit margin.

What genuine objection can there be to dealing with these claims on a more businesslike basis? If a business outside the electrical industry seeks discount privileges, then I suggest that this should only be given subject to a formal declaration embodying the appropriate fair trading qualifications, signed at director level of the applying company.

I have put this simple suggestion to several manufacturers, and have met the following evasions:—1. We should get thrown out on our neck. 2. It is like calling a man a liar. 3. If we did it, our competitors would walk in. 4. I will check up on our traveller, but I cannot go to the client.

So-called fair trading is distasteful humbug unless the policy is honestly implemented, and I invite manufacturers and wholesalers to say why signed declarations should not and could not be a pre-requisite of favours sought and granted.

London, E.C.4. J. MORTIMER HAWKINS,
Managing Director,
Mortimer, Gall & Co., Ltd.

Hedge-Cutter Accident

MANY people will be perturbed by the report in the daily Press of a serious accident to Field Marshal Alanbrooke whilst using an electric hedge cutter. It was stated that he received a shock when trying to flick a speck of mud from a cable joint.

In the interests of all users of this apparatus I consider that a fuller explanation could be given as to the type of joint as I find it difficult to believe that, with a properly designed coupling, a person can receive a shock from a piece of mud on that coupling.

This leaves an alternative thought that the joint referred to was perhaps a temporary repair to a break in the cable, and it may even be that the live wire was exposed; but in the absence of an authoritative report on the matter many people are considering discontinuing the use of this type of apparatus from the safety point of view.

Alderley Edge, Manchester. B. E. LEESON.

Institution Benevolent Fund

The annual report of the governors of the incorporated benevolent fund of the Institution of Electrical Engineers has just been issued, preparatory to the annual general meeting of members of the fund to be held on 19th October at the Institution.

Income for the year was made up of £12,854 from subscriptions and donations and £2,967 from dividends, interest and rents, including those associated with "The Chesters" trust. Subscription income for the year was a little below the total expenditure of £13,151, but with other income considered an excess of income over expenditure of £2,110 is transferred to capital account.

British Trade Fair at Copenhagen

FOR two weeks the British Trade Exhibition organized by British Overseas Fairs, a subsidiary of the Federation of British Industries, has been taking place in Copenhagen. More than 600 British firms are represented in the exhibition which is in two parts, the lighter goods being shown in the famous Tivoli Gardens and the heavier goods in the Forum.

One of the most colourful displays of applied floodlighting ever seen in Scandinavia has been prepared by the General Electric Co., Ltd., in the illumination of the historic Rosenburg Palace and the Arena, where a military tattoo has been taking place. The main castle illumination is by red neon lights supplemented by sodium units. The colour of the roof is emphasized at night by blue fluorescent tubes mounted along the guttering. Additional tungsten floodlights are focused on the tops of the rear towers visible to spectators in the Arena stands. The Arena itself is floodlit from six towers carrying a total of sixty 1,500 W tungsten fittings.

The floodlighted Rosenburg Palace and Arena, Copenhagen

The G.E.C. is also well represented in the exhibition, where a comprehensive selection of the company's products is on view. Equipment, models and photographs illustrate the generation and industrial utilization of power, electronics and communications, lighting and ventilation and domestic equipment.

The Brush Electrical Engineering Co., Ltd., also shows a wide range of products including generators, transformers and fusegear, while associated companies such as the National Gas & Oil Engine Co., Ltd., Mirrlees, Bickerton & Day, Ltd., J. & H. McLaren, Ltd., and Petters, Ltd., are showing prime movers and generating sets in various sizes.

An interesting exhibit by Creed & Co., Ltd., is its new facsimile system for the electronic transmission of written messages between positions connected by telephone wire.

A last-minute exhibit at the fair is the Ekco export television receiver which has a 9in tube, incorporates its own telescopic aerial and a 12-position turret tuner, weighs 30 lb and will operate from a 12 V car battery or from a.c. mains.

Other British electrical and allied companies represented either directly or through their Danish agents include:—Varley Dry Accumulators, Chloride Batteries, Morphy-Richards, C.A.V., Crypton Equipment, Rotax, Cosmocord, Belling & Lee, A. F. Bulgin & Co., Colvern, Dubilier Condenser (1925), Electro Acoustic Industries, Ferranti, George Bray & Co., A. H. Hunt (Capacitors), Magnetic & Electrical Alloys, Morganite Resistors, Murex, Painton & Co., Permanoid, Plessey International, Salford Electrical Instruments, Welwyn Electrical Laboratories, Smith's Industrial Instruments, Rheostatic Co., Automatic Coil Winder & Electrical Equipment Co., Croydon Precision Instrument Co., Record Electrical Co., Ernest Turner Electrical Instruments, Edison Swan Electric Co., Scientific Instrument Manufacturers' Association of Great Britain, Dawe Instruments, Evans Electroselenium, H. W. Sullivan, Stanton Instruments, W. G. Pye & Co., Telegraph Construction & Maintenance Co., Unicam Instruments, Townson & Mercer, Bakelite, British Geon, British Resin Products, and Permali.

Fair Trading Policy

THE Electrical Fair Trading Council (Sardinia House, Kingsway, London, W.C.2) has published the sixth edition of the Electrical Fair Trading Policy embodying amendments and additions made since March, 1953.

Among the new features is an introduction giving a brief outline of the origin and development of electrical fair trading. There has also been a certain amount of rearrangement. For instance the wording of the "General Principles" has largely been transposed, but the essential character of those principles has been preserved. Subheadings in this section make for easier reference and understanding. Under "Discounts to Commercial and Industrial Buyers" the words "in recognition of their buying capacity" are new, and provide the reason for the grant of such discounts, where operative.

The definition of "Electrical Contractor" is amplified by embracing technical qualifications. The "Electrical Retailer" definition is also amplified, by the mention of responsibility for "after sales" service. The definitions of "Special Large Buyer" and "Recognized User" have been strengthened by the addition of the words—"buying for his or their own use and not for resale."

The discount to "Recognized Users" in the schedules and categories for electric light fittings has been reduced from 15 to 10 per cent throughout. In Schedule 3, Category 3, the differences in discount between fluorescent lamp fittings and tungsten lamp fittings are eliminated. Under "Garages" on the page facing Schedule 3, the discount for all products has been rationalized to 10 per cent. These and other alterations have been previously reported in the *Electrical Review*.

The scope of Schedule 6, covering "Switches (Air Break) and Distribution Fusegear," is extended to include products up to and including 500 A, 600 V per way, instead of 200 A, 600 V per way, as hitherto. In Schedule 11, "Electric Discharge Lamp Auxiliaries," discount to "Recognized Users" has been reduced from 15 to 10 per cent. In Schedule 12, "Electrical Ceiling and Table Fans," discount to "Special Large Buyers" has been reduced from 25 to 10 per cent.

All the alterations have been agreed by the Fair Trading Council, in consultation with the appropriate sections of the industry. Further copies of the policy can be obtained at 2s per copy (including postage).

Financial Section

STOCKS and SHARES

IN THE Stock Exchange, the effect of the Chancellor's review of affairs at Bournemouth has been to tilt the scale emphatically in favour of gilt-edged stocks. Repetition of his resolve to defend the value of sterling by squeezing the inflation out of the home economy, and a growing conviction about the unlikelihood of another rise in Bank Rate, induced a notable revival of confidence in gilt-edged securities. By rising to 80, War Loan showed a gain of as much as $4\frac{1}{2}$ points within the short space of a month. British Electricity stocks have risen substantially during the past few days. By contrast, industrial share prices sank under Mr. Butler's indication of sterner measures to be detailed in the coming session. The market indices record that industrials have lost, on the average, 18 per cent of their value since midsummer.

Weak Industrials

Leading electrical equipment shares continued to slip. The premium on the new English Electric shares narrowed to 1s; the first call of 30s per share is due to be paid by next Monday, 17th October. Associated Electricals lost 5s to 75s, which is 21s below this year's highest price. General Electrics at 60s and C. A. Parsons at 77s 6d are also £1 or more under their recent best, and in the case of Reyrolles at 95s the decline has exceeded 30s. The fact that many of the biggest falls affected shares showing relatively small yields on the basis of current dividends was evidently connected with the Chancellor's references to the need for restraint in the distribution of profits. Radio shares have been depressed by the possibility that radio and TV sets may be included in the "further measures." Hall Telephones were a bright feature amid the surrounding gloom.

T.I. Capital

Initial market reactions to news of the Tube Investment capital plans made a welcome exception to the ruling tendency for quotations to recoil at the prospect of a big issue of new shares in these unreceptive conditions. After declining from 95s to 88s in the few days preceding the announcement, Tube Investments £1 shares recovered at first the whole of the setback, although easing later to 90s in conformity with the general drift of prices. A good reception was encouraged, on the one hand, by the very low price of 22s 6d, at which stockholders are invited to subscribe for new ordinary shares (on a one-for-one basis), and, on the other, by the chairman's accompanying statement about trading results and prospects. Results for the year ended last July, due to be published next month, are expected to record an advance in profits (before tax) from about £5¾ to £8½ million. The new issue will raise over £8 million fresh capital towards further modernization and development work.

Valuable Rights

On the basis of a quotation of 90s for the existing Tube Investments ordinary

The Week's Price Changes

Company or Board	Nom. Value	Middle price 10th Oct.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1955 Highest	1955 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	81½	+2	3	3	3 13 10	94⅜	76½
Brit. Elec. 1974/77	100	80	+2½	3	3	3 15 0	93⅝	75½
Brit. Elec. 1976/79	100	83½x.d.	+2	3½	3½	3 17 10	98¾	80½
Brit. Elec. 1974/79	100	95½	+4	4¼	4¼	4 16 0	109	90½
Overseas Electric Supply								
Calcutta Elec.	£1	22/-		6†	6†	5 9 0	22/6	20/9
East African Power	£1	20/-x.d.		7	7	7 0 0	24/6	19/9
Nigerian Elec.	£1	21/-	−6d	10	10	9 10 6	27/-	21/-
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	22/9	21/-
Perak Hydro-Elec.	£1	21/6	+6d	10	10	9 1 9	22/-	17/9
Equipment and Manufacturing								
Aberdare Cables	5/-	11/6	−6d	12½	17½	—	14/6	11/-
Aerialite	1/-	6/-	−6d	88⅛	88⅛	—	6/7	5/3
Allen, W. H.	£1	75/-	−2/6	20	20	5 6 9	83/9	77/-
Aron Elec. Ord.	£1	59/6	−6d	15	15	5 0 9	63/9	55/6
Assoc. Elec. Ord.	£1	75/-	−5/-	11¼	14	3 14 9	96/-	62/6
Automatic Tel. & El.	£1	60/-	−3/9	15	15*	5 0 0	79/6	60/-
Babcock & Wilcox	£1	75/-	−5/-	12*	15	4 0 0	98/-	68/6
Baldwin, H. J.	2/-	4/9x.d.	+3d	20	20	8 8 6	5/6	4/4
Bakelite	10/-	31/6	−1/-	12½	16	5 1 6	34/6	27/-
British Aluminium	£1	48/9x.d.	−2/-	10	12	4 18 6	58/-	35/3
B.I. Callender's	£1	45/-	+6d	10	10	4 9 0	55/3	44/9
B.I. Callender's 6% Pref. ...	£1	21/9		6	6	5 10 3	26/6	21/9
British Thermostat	5/-	30/-	−1/3	27½	27½	4 11 9	35/-	22/6
British Vac. Cleaner	5/-	6/9	−3d	25	30	—	10/-	6/9
Brook Motors	10/-	44/6		20	20*	4 10 0	46/3	39/9
Brush Ord.	5/-	7/6	−9d	6	10	6 13 3	9/6	7/6
Bulgin, A. F.	1/-	6/9	−6d	30	45	6 13 3	8/-	4/-
Burco Dean	5/-	12/9	−6d	—	—	—	17/3	12/9
Chloride El. Storage	£1	61/3	−5/-	12½	17½	5 13 10	77/6	58/6
Clarke Chapman	£1	90/-	−7/6	20	20*	4 9 0	102/6	68/9
Cole, E. K....	5/-	19/6	−2/9	27½	17½*	4 9 9	25/6	18/3
Cossor, A. C.	5/-	8/9	−1/3	10	15	8 11 6	14/-	8/9
Crabtree	10/-	28/6	−6d	17½	20	7 0 3	34/6	28/6
Crompton Parkinson Ord. ...	5/-	15/6		20	20	—	19/9	16/-
De La Rue	5/-	17/-	−2/-	20	30	8 16 6	26/-	17/-
Decca	4/-	34/6	−3/9	35	56¼*	—	48/9	31/-
Desoutter	5/-	33/9		20	25	3 14 0	35/-	25/6
Dewhurst	2/-	10/-		19	24	4 16 0	10/6	7/3
Dictograph Tel.	2/-	7/6		20	20	5 6 9	9/3	6/6
Dubilier Condenser	1/-	4/3		25	25*	5 17 9	5/7	3/1
E.M.I.	10/-	25/6	−1/3	8	10	3 18 6	37/-	25/3
Electrical Components	5/-	15/-x.r.		20	25	8 6 9	21/3	15/-
Elec. Construction	£1	30/9		15	8½*	5 10 6	41/3	30/9
Enfield Cable Ord.	£1	20/-		Nil	Nil	Nil	25/3	20/-
English Electric	£1	60/-	−2/6	10	12½	4 3 4	86/9	54/3
English Electric 3¾% Pref. ...	£1	14/-		3¾	3¾	5 7 3	16/9	14/-
Ericsson Tel.	5/-	37/6x.d.	−1/6	25†	25†*	3 6 9†	46/6	29/-
Ever Ready	5/-	28/6	−2/-	40	35*	6 2 9	38/-	22/3
Falk Stadelmann	£1	47/6		15	15	—	52/6	42/-
G.E.C. Ord.	£1	60/-	−2/6	12½	14	4 13 3	80/3	51/3
G.E.C. 6½% Pref.	£1	23/9		6½	6½	5 9 5	28/4	23/6
General Cables	5/-	15/9		30	30	9 10 6	17/-	15/-
Greenwood & Batley	£1	52/6		17½	17½	6 13 4	57/6	52/6
Hackbridge Cable	5/-	20/3	−9d	20	25	6 3 6	22/6	14/-
Hackbridge & Hewittic	5/-	20/3	−1/-	25	30	—	24/9	17/-
Hall Tel. Acc.	10/-	28/9	+2/6	10	10	3 9 6	28/9	11/-
Heatrae	2/-	5/-		12½	15	6 0 0	5/9	4/3
Henley's	10/-	15/9	−6d	10½	10½	6 13 3	21/3	15/9
Holophane	5/-	17/6	−1/3	25	30	8 11 6	19/9	16/-

* After scrip issue. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

shares, the rights to the coming issue of new shares at 22s 6d are worth 33s 9d each, so that a price of about 56s 3d in the "ex-rights" form is at present in prospect. Regarding future dividends, the board proposes, on the existing capital, a final making a total for the past year of 22½ (against the previous rate of 17½) per cent; and on the increased capital a total for the current year of 12¾ per cent. Allowing for the period when the new shares will be only partly paid, such a distribution on the doubled capital would be equivalent to 14 per cent, and it is on this dividend basis that the chairman says the shares may provisionally be regarded. On these assumptions, the prospective yield on T.I. shares is in the neighbourhood of 5 per cent.

in Electrical Investments

Company or Board	Nom. Value	Middle price 10th Oct.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1955 Highest	1955 Lowest
Equipment and Manufacturing—continued								
Hoover	5/-	43/-	+1/6	45	70	8 3 0	52/6	37/-
I.C.I.	£1	44/3x.d.	−4/-	15	10°	4 10 6	61/9	38/3
Intl. Combustion	5/-	18/6		20	25	—	24/6	16/3
Johnson & Phillips	£1	39/6	−2/6	15	15	7 13 10	52/6	41/-
Lancashire Dynamo	£1	45/-	−5/-	14	15	—	56/6	37/3
Laurence, Scott	5/-	17/-	−6d	20	12½°	3 13 6	19/6	14/6
Lister, R. A.	£1	30/-	−1/-	12	9·3°	6 4 0	40/-	30/-
London Elec. Wire	£1	51/3	−1/3	10	12½	4 17 6	61/3	50/6
Lucas, J.	£1	40/-	−3/9	10·8	7½°	3 15 7	56/6	40/-
Marryat & Scott	2/-	10/3	−2/6	25	30	5 17 0	13/-	9/6
Mather & Platt	£1	63/-	−1/6	15	13·4°	—	75/-	48/-
Metal Industries	£1	27/3	−3d	9	9	6 12 0	38/-	26/6
Midland Elec. Mfg.	£1	48/9		15	10°	4 2 0	55/-	44/-
Morphy-Richards	4/-	28/9		35	50	6 18 9	35/-	27/-
Murex	£1	60/9	−1/9	15	15	4 18 9	66/-	49/3
Newman Ind.	2/-	2/9		10	10	7 5 6	3/6	2/4
Oldham & Son	1/-	2/9		17½	20	—	3/6	2/1
Parnall (Yate)	5/-	8/3	−9d	8	14	8 9 9	13/2	7/3
Parsons, C. A.	£1	77/6x.d.	−4/6	7½	10	2 11 6	100/-	56/-
Plessey	10/-	63/9	−6/3	30	20°	3 2 9	89/-	57/6
Pye Deferred	5/-	18/6	−3/6	20	12½°	3 7 6	23/9	14/3
Revo	10/-	13/9		27½	9°	6 11 0	15/6	12/6
Reyrolle	£1	95/-	−5/-	13¾	15	3 3 3	127/6	89/-
Rheostatic	4/-	12/6	−3d	20	22½	—	14/3	9/3
Richardsons Westgarth	5/-	15/-	−3d	15	16⅔	5 11 0	19/-	11/-
Scottish Cables	4/-	16/9	−6d	27½	27½	6 11 3	22/6	16/9
Smith (England), S.	4/-	15/-	−6d	15	17½	4 13 3	20/-	15/-
Southern Areas	£1	32/6		7½	10	6 3 0	38/-	27/6
Strand Elec.	5/-	8/3		17½	15°	9 1 9	13/3	7/6
Sturtevant	5/-	30/-x.d.		18·9	14·4†°	2 8 0†	35/9	21/-
Sun. Elec.	£1	35/-		15	15	8 11 6	35/-	33/9
Switchgear & Cowans	5/-	15/-		10	20	6 13 3	17/-	11/-
Taylor Tunnicliff	5/-	13/9		12½	15	5 9 0	16/3	11/3
T.C.C.	10/-	47/6x.d.	−9d	30	25°	5 5 3	53/9	41/-
T.C. & M.	£1	29/3	−2/9	8½	8½	5 19 8	40/9	30/-
Telephone Mfg.	5/-	7/9	−2/9	10	10	6 9 0	11/6	7/9
Thorn Elec.	5/-	19/6	−3/3	20	15°	3 17 0	33/-	13/9
Thornycroft	£1	42/6		15	15	—	47/6	34/6
Tube Investments	£1	90/-	−5/-	17½	22½	—	107/6	72/6
Vactric	5/-	16/3	−1/3	10	15°	4 12 3	22/-	12/-
Veritys	5/-	10/6		12½	12½	5 19 0	12/3	7/-
Wallsall Conduits	4/-	14/3	−3d	70	70	—	17/3	12/-
Ward & Goldstone	5/-	35/-	−1/3	50	30°	4 5 9	45/-	32/6
Watford	2/-	7/6x.d.		22½	25	—	8/9	6/3
Westinghouse Brake	£1	90/-	−2/6	16	18	4 0 0	110/-	82/-
West, Allen	5/-	12/9	−6d	17½	15°	5 17 8	16/6	8/-
Wolf Electric	5/-	21/-		17½	20	4 15 3	21/-	16/1
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A. Ord.	100	69½		6	6	8 12 9	88	67½
Ord.	100	45		3¾	3¾	8 6 8	54½	45
Anglo-Portuguese	£1	24/6		8	8	6 10 9	27/-	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	19/-	−2/-	50	22½°	5 18 0	24/3	19/6
Cable & Wireless:								
Ord.	£1	41/9	−1/3	9	10	4 15 9	54/-	39/6
4% Loan	100	92½		4	4	4 6 6	100	92
Calcutta Trams	£1	25/3	−6d	6†	7½†	5 18 9†	26/3	20/-
Cape Elec. Trams	£1	18/9		5½	7½	8 0 0	19/6	16/6
Marconi Marine	£1	32/6	−1/3	10	10	6 3 0	41/3	32/6
Oriental Tel. Ord.	1/-	75/-		16	—	—	102/6	72/6
Telephone Rentals	5/-	10/9	−9d	10	12½	5 16 3	13/6	9/6

Morphy-Richards Results

Excellent figures for the year to last June, and an increase in the ordinary dividend, brought in support for Morphy-Richards 4s shares, which held firm at 28s 9d. With group profits up by £155,000 to a record £473,000, the net surplus (after tax of more than £200,000) is doubled at £211,000, and provides three-fold cover for the net amount of the ordinary dividend distribution. The latter is being made up to a total of 50 per cent, of which the final 30 per cent is payable on capital increased by the "rights" issue of last June, and by the shares issued in part payment for the capital of Astral Equipment, the refrigerator firm. Last year's dividends came to a total equivalent of 35 per cent on the capital of £186,000 issued at the end of the period. Present ordinary capital of the company is £245,000. At the new rate of dividend the yield on the shares goes up to nearly 7 per cent.

Holophane Dividend

The 5s ordinary shares of Holophane, Ltd., the street lighting and illumination specialists, have been one of the relatively few firm points lately, hardening to 17s 6d on the strength of the results reported for the year to June last. An improvement by about one-third in the net taxed profit of £66,000 provides comfortably for a rise in the ordinary dividend to a total of 30 per cent. A year ago the rate was raised from 20 to 25 per cent. From the preliminary figures, it appears that the new rate is covered two-and-a-half times by the surplus available for distribution and reserves. General reserve is to be raised by £50,000, and will become, by itself, equal to the issued capital of £150,000, all of which is in ordinary stock.

A. H. Hunt (Capacitors)

A. H. Hunt (Capacitors) 4s ordinary shares were called 21s 6d after the announcement of the company's capital plans. Details of share issues both for cash and by way of a capitalization of reserves are expected to go out after a meeting to be held on the 28th of this month. Development plans to deal with a continued expansion of home and export markets were outlined in the annual report issued early this year. They included extensions to the Wrexham plant, and the erection of a new factory in the Croydon area. Progress was reported also in connection with the Canadian enterprise established jointly with the Canadian Marconi Company. Present capital of A. H. Hunt is £165,000. The dividend for 1954 was raised from 25 to 27½ per cent, on which basis the shares at their present price show a yield of a little over 5 per cent.

REPORTS and DIVIDENDS

Tube Investments, Ltd.—It is proposed to raise £8,153,360 by a one-for-one rights issue of 7,247,431 new ordinary £1 shares at 22s 6d each. Treasury consent to the issue has been obtained. The authorized capital is to be increased by £8,700,000 to £23 million. The additional capital is required to finance the continuing modernization and expansion of manufacturing development and research facilities and to provide working capital. The issue will not be underwritten, but Helbert, Wagg & Co. and J. Henry Schroder & Co. will, for a fee, subscribe at the issue price for any shares not taken up and dispose of these so that the net proceeds can be distributed to ordinary stockholders failing to take up their rights.

Sir Ivan Stedeford (chairman) stated last week that the accounts, to be issued in November, were now sufficiently advanced for him to be able to state that the profit for the year to 31st July last, before taxation, would be about £8·5 million, as compared with £5·7 million for the previous year. The outlook for the current year was satisfactory. The directors would recommend at the annual meeting on 12th December a final dividend of 12½ per cent, making 22½ per cent for the year on the present capital. The intention then was to pay an interim dividend of 5¾ per cent next May for the current year on the larger capital, followed by a final dividend of 7 per cent. This would be equivalent, after allowing for the period during which the new shares would be partly paid, to approximately 14 per cent.

Associated Electrical Industries, Ltd., has offered to purchase the whole of the ordinary share capital of the Hill Top Foundry Co., Ltd., at 4s 6d for each 1s share. The authorized and issued ordinary capital of the Hill Top Co. is £60,000 in 1,200,000 1s shares. The offer is conditional upon its acceptance by shareholders holding at least 90 per cent in value (or such lesser percentage as A.E.I. may decide) and upon the three executive directors of the Hill Top Co. entering into service agreements with the company for a period of years.

A. H. Hunt (Capacitors), Ltd.—An extraordinary meeting will be held on 28th October at which a resolution will be submitted authorizing an increase of capital to £500,000 by the creation of 1,500,000 ordinary shares of 4s each. It is proposed to finance part of the company's development programme out of its own resources, and to raise the balance by an issue of ordinary shares. In addition, the directors consider that the time has come to bring the issued capital more in line with actual capital employed in the business by the capitalization of some of the reserves. The authorized capital is being increased by more than is necessary for the proposed issues, so that there will remain some unissued capital available for future issues. Details of the cash issue and the proposed capitalization of reserves will be announced shortly after the extraordinary meeting.

Newton Brothers (Derby), Ltd.—In the course of his speech at the annual meeting held on 3rd October, Mr. F. V. Pipe (chairman) said that orders outstanding at 31st March last were considerably less than at 31st March, 1954, due to the systematic reduction of the arrears, but were still considerable. Since the end of the financial year the rate of incoming orders had about equalled the present production rate without regular overtime, and regular—as distinct from spasmodic—overtime working had now been stopped. They were now planning to put in hand extensive reconditioning of the works. Export work amounted to 18½ per cent of the total production as compared with 21 per cent in the previous year.

Morphy-Richards, Ltd.—The group profit for the year ended 30th June last is £472,728, as compared with £317,881 for 1953-54. United Kingdom and overseas taxation totals £219,533, leaving a net balance of £211,127 (against £103,842), of which £197,285 is attributable to the parent company. It is proposed to pay a final dividend of 30 per cent on £244,945 ordinary stock, of which £28,607 ranks only for 15 per cent, as increased by shares issued in part satisfaction of the acquisition of Astral Equipment and by a rights issue of one-for-seven. The interim dividend of 20 per cent was paid on capital of £185,720. For 1953-54 the total dividend was equivalent to 35 per cent on £185,720 capital, the interim dividend of 15 per cent being paid before the scrip issue of 50 per cent. The balance carried forward is £268,609 (against £137,980 brought in).

Holophane, Ltd.—The profit, before taxation, for the year ended 30th June last is £129,693, and after providing £63,900 for taxation, the net balance is £65,793 (against £48,333). General reserve receives £50,000 and it is proposed to pay a final dividend of 22½ per cent (against 17½ per cent), making 30 per cent for the year (25 per cent). The balance carried forward is £64,053 (against £74,135 brought in).

The North of Scotland Hydro-Electric Board has issued to the National Debt Commissioners £15 million of 4½ per cent stock, 1965-66, at 98 per cent, guaranteed as to principal and interest by the Treasury. The purpose of the issue is to repay temporary advances from Scottish banks, to defray further expenditure on constructional schemes and for other purposes.

The Drayton Regulator & Instrument Co., Ltd., has declared an interim dividend of 5 per cent. For the previous year the interim dividend was 10 per cent, but this was paid before a 200 per cent scrip issue.

T. Clarke & Co., Ltd., propose to make a scrip issue to shareholders of 500,000 2s ordinary shares.

G. D. Peters & Co., Ltd., has declared an interim dividend of 2½ per cent (against 1⅞ per cent).

Increases of Capital

Creed & Co., Ltd.—Increased by £200,000, in £1 ordinary shares, beyond the registered capital of £600,000.

Thorn Electrical Industries, Ltd.—Increased by £1,067,500, in 4,230,000 ordinary shares of 5s and 10,000 5 per cent 2nd cumulative preference shares of £1, beyond the registered capital of £1,250,000.

Liquidations

F. Clough & Co. (Electric Washing Machines), Ltd. — Particulars of claims by 29th October to the liquidator, Mr. J. Colman, 1, Dalton Square, Lancaster.

Collier Electric (Switches), Ltd.—Particulars of claims by 21st October to Mr. A. C. Blake, 199, Piccadilly, London, W.1. This notice is purely formal. All creditors have been or will be paid in full.

F. J. Coleman (Electrical Contractors), Ltd.—Winding up voluntarily. Liquidator, Mr. N. W. Osborne, 11-12, Finsbury Square, London, E.C.2, appointed 29th September.

Bankruptcies

W. E. Crees, 171, Lavender Hill, Battersea, London, electrical engineer. —Public examination 9th December at the Court House, Garratt Lane, Wandsworth, S.W.18.

F. Lockett, lately carrying on business at 10, Blackburn Road, Great Harwood, Lancs, electrician and fireplace dealer. — Second and final dividend of 6d in the £, payable at Bank Chambers, Lord Street West, Blackburn.

S. Shaw, 133, Leeds Road, Bradford, electrical contractor.—Receiving order made 1st October on debtor's own petition.

D. Cunningham and **A. E. Beacock,** carrying on business in co-partnership as "The Home Electrical Maintenance Co.," electrical maintenance service engineers, at 39-40, Trevelyan Chambers, Boar Lane, Leeds.—Order of adjudication dated 15th January, 1936, annulled, and receiving order dated 15th January, 1936, rescinded on 12th September last, in so far as each refers to the separate estate of D. Cunningham, on the grounds that debts have been paid in full.

GENERATION AND DEVELOPMENT

High Marnham Power Station

Initial site work has just begun on the construction for the Central Electricity Authority of the largest generating station yet projected in this country, the Authority having now received the consent of the Minister of Fuel and Power to build the proposed station on the Trent at High Marnham in Nottinghamshire. The consent is for the largest amount of generating plant authorized by the Minister at one time and covers five 200 MW turbo-generator sets and associated boiler plant. Each of the generating sets will be more powerful than most of the Authority's complete power stations. In fact there are only 26 stations out of a total of 275 in which all the plant in the station has a capacity greater than one of these machines. The five boilers serving the sets will operate at the most advanced steam conditions so far proposed in this country, the pressure and temperature being 2,450 lb/sq in and 1,060 deg F; they will produce steam at the rate of 3,125 tons/hr. Hitherto the most advanced conditions have been at Drakelow (1,550 lb/sq in and 1,050 deg F) also on the Trent.

The advantages of using such large generating sets and boilers are twofold. They produce electricity more cheaply because of higher operating efficiency and they permit substantial economies in capital expenditure on both plant and buildings. The High Marnham station is expected to achieve an average annual thermal efficiency of 33 per cent as compared with the present average of all steam stations of 24·08 per cent.

The 200 MW High Marnham machines are only 2ft 6in longer than 100 MW sets. The first set at High Marnham is expected to begin operating in 1959. When fully completed the station, which has been designed by the Authority's headquarters engineering staff, will consume about 2½ million tons of coal a year.

New Station at Northfleet

The Central Electricity Authority has applied to the Minister of Fuel and Power for consent to the establishment of a generating station at Northfleet, Kent.

Calder Hall Station

Speaking at the opening of an exhibition of the peaceful uses of atomic energy in Birmingham last week, Mr. F. M. Greenlees, chief engineer of the Atomic Energy Commission's Industrial Group, said that power would not be available from the Calder Hall atomic power station until some time in the latter half of next year—not in the first half of the year as had been suggested.

C.E.A. Contracts

Contracts have been placed by the Central Electricity Authority during the past month for power stations, transforming stations and transmission lines amounting to £17,151,830. They include the following:—

Marchwood power station, near Southampton: Two 30,000 lb/hr auxiliary boilers. —John Thompson Water Tube Boilers.

Poole station: One 340,000 lb/hr boiler.—International Combustion.

Staythorpe "B," Newark: Two 550,000 lb/hr boilers.—Babcock & Wilcox.

Willington "A," near Derby: 275 kV, 7,500 MVA switchgear.—British Thomson-Houston Co.

Lincoln: Superstructure.—Wm. Moss & Sons.

Rogerstone, Mon: Two 60,000 kW turbo-generators, condensing and feed heating plants.—C. A. Parsons & Co. Two reinforced concrete cooling towers.—Film Cooling Towers (1925), Ltd. One chimney.—J. L. Kier & Co.

Mexborough, Yorks: Superstructure.—J. Gerrard & Sons.

Sittingbourne substation: 132 kV, 2,500 MVA switchgear.—English Electric Co.

Ellesmere Port substation: 132 kV, 3,500 MVA switchgear.—Ferguson Pailin.

Dickinson Street substation, Manchester: 60 MVA, 132/33 kV transformer.—Ferranti.

Fleet and Pyestock: 132 kV overhead line. —Balfour Beatty & Co.

Great Yarmouth: 33 kV and multicore cables.—Pirelli-General Cable Works.

Willington substation: 275 kV twin 0·4 sq in overhead line.—Watsham's.

East Midlands Area

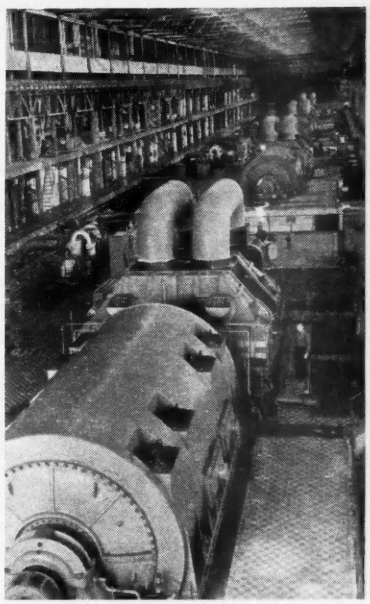
From the East Midlands Electricity Board we have received a ¼in to the mile map of its area showing the boundaries of the sub-areas and districts. The Board has also sent us a copy of the summary of its annual report and accounts which it has again distributed to all its employees. This takes the form of a small well-illustrated booklet in which the salient points in the past year's operations are effectively brought out.

Musselburgh Reinforcement

The South of Scotland Electricity Board has approved a scheme for the reinforcement of supply to Musselburgh. Two 11 kV rings will be established by laying over 1,400 yd of 11 kV cable and reconstructing an existing overhead line. A new substation will also be built and equipped. The scheme will cost approximately £12,800 and will be completed during the summer of 1956.

Supply to Isolated Village

A party of officials of the South of Scotland Electricity Board and Press travelled to Riccarton, an isolated railway village in Roxburgh, on 30th September to see Mr. J. E. S. Nisbet, vice-convener of Roxburgh, switch on the electricity supply. The 37 houses were all equipped with



Interior of the recently-commissioned Mironovskaya State power station in the Stalino Region of Russia. The station, situated in the Donetz Coal Basin, uses as fuel the tailings of concentration works and anthracite duff

electric cookers in preparation for the switch-on, the cookers being drawn by horse sledge to the houses as there is no road communication. The scheme marks one of the last large units of construction in the Dumfries and Galloway area, since rural electrification has now reached the point where 72 per cent of the farms are on the mains. The remainder are scattered hill farms which cannot be treated as groups. In this area 1,578 farms were equipped before April, 1948; since then 1,357 farms have been linked, making 2,935 connected. The annual consumption per farm has risen from 6,500 kWh in 1948 to 10,000 kWh in 1955.

"Manweb" Tariff Variations

Revisions of the standard domestic, commercial and industrial, and farm tariffs are announced by the Merseyside and North Wales Electricity Board. The variations, which came into force on 8th October, are as follows:—

Domestic Tariff.—Follow-on rate of 0·85d/kWh increased to 1d.

Commercial and Industrial Tariffs.—Rate of 1d/kWh increased to 1·125d in tariffs 2, 3 (a), 3 (b) and present tariff 4, now renumbered 4 (a). The following new tariff 4 (b) is offered as an alternative to 4 (a): For lighting (separately metered), 4½d/kWh; for all other purposes, 2d/kWh for first block and 1·125d/kWh thereafter. The first block is calculated at 2,000 kWh per quarter for up to 15 kW of total installed load (excluding lighting) plus 100 kWh per quarter for additional kW. In computing the installed load any apparatus for cooking, baking or water-heating is to be assessed at half its rated capacity.

Farm Tariffs.—The follow-on rate of 0·85d/kWh in tariff F2 is increased to 1d and the rate of 1d in tariffs F3 and F4 is raised to 1·125d.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 0d each including postage) will be obtainable after 16th November from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1948

1269. Rangabe, A. R., and Buckingham, J.—Thermionic valves. 27th May, 1949. (740680.)

1950

24471. Pye, Ltd.—Television apparatus. 2nd October, 1951. (740442.)

29430. Standard Telephones & Cables, Ltd.—Automatic telecommunication exchange system. 1st December, 1950. (740531.)

1951

7374. Brush Electrical Engineering Co., Ltd.—Control systems for i.c. engine electric power plant. 22nd May, 1952. (740683.)

12000. Mullard Radio Valve Co., Ltd.—Variable inductances for use in line time base circuits of television receivers. 6th May, 1952. (740532.) 22324. Television receivers. 29th July, 1952. (740613.)

24172. Electric & Musical Industries, Ltd.—Electrode assemblies for electron discharge devices. 9th October, 1952. (740614.)

1952

356. Henley's Telegraph Works Co., Ltd., W. T., Booth, D. H., and White, F. T.—Formation of impermeable membranes in cable joints. 2nd January, 1953. (740748.)

8586. Siemens-Schuckertwerke Akt.-Ges.—Metal vapour electric discharge devices. 3rd April, 1952. (740447.)

10494. Pye, Ltd.—Signal distribution systems. 24th April, 1953. (740448.)

21285. British Thomson-Houston Co., Ltd.—Methods of manufacturing electrically conductive coils. 4th November, 1953. (740543.)

21489. Mullard Radio Valve Co., Ltd.—Television receivers. 17th August, 1953. (740753.)

21717. Automatic Telephone & Electric Co., Ltd.—Automatic switching systems. 13th July, 1953. (740450.)

23332. British Thomson-Houston Co., Ltd.—Ferrite magnetic materials. 17th September, 1953. (740755.)

23466. General Electric Co., Ltd., Bloch, A., Medhurst, R. G., and Pool, S. D.—Aerial systems. 4th September, 1953. (740698.)

25522. Electric & Musical Industries, Ltd.—Fluorescent screens. 24th September, 1953. (740454.)

26637. Patent-Treuhand-Ges. für Elektrische Glühlampen.—Activating material for electrodes in electric discharge devices. 23rd October, 1952. (740456.)

27983. Philips Electrical Industries, Ltd.—Electric discharge tubes for millimetric waves. 6th November, 1952. Addition to 704378. (740701.)

29004. Napier & Son, Ltd., D.—Electrical surface heating apparatus. 1st December, 1953. (740551.)

30480. Electric & Musical Industries, Ltd.—Electric motor control systems. 18th November, 1953. (740623.)

32553. Tesla Narodni Podnik.—Thermionic feedback oscillation. 23rd December, 1952. (740624.)

1953

954. Automatic Telephone & Electric Co., Ltd.—Electric wave filters. 30th December, 1953. (740465.)

2880. Foster Transformers, Ltd., Courtney, T., and Green, A. H.—Current transformers. 2nd February, 1954. (740467.)

4350. Power-Gas Corporation, Ltd.—Gas cleaning apparatus incorporating electrostatic precipitators. 22nd March, 1954. (740765.)

5184. Babcock & Wilcox, Ltd.—Tubulous vapour generators. 22nd February, 1954. (740710.)

6220. Electric & Musical Industries, Ltd.—Electron discharge tube arrangements. 25th March, 1954. (740472.)

7018. General Electric Co., Ltd., Bate, H. C., Bowtell, J. N., and Miles, E. E.—Electroluminescent devices. 12th March, 1954. (740473.)

7708. Wilman, C. W.—Electrical selector switches. 15th February, 1954. (740476.)

7745. National Research Development Corporation.—D.c. amplifier apparatus. 22nd March, 1954. (740477.)

8102. M-O Valve Co., Ltd., and Jenkins, R. O.—Manufacture of directly heated thermionic cathodes. 19th February, 1954. (740478.)

8456. English Electric Co., Ltd.—Electrical filter networks. 25th June, 1954. (740768.)

12121. English Electric Co., Ltd.—Automatic control systems for machines. 30th April, 1954. (740773.)

12816. Naamlooze Vennootschap Heemaf.—Alternators with d.c. excitation. 7th May, 1953. (740569.)

13144. Centre National de la Recherche Scientifique.—Methods of making permanent magnets. 11th May, 1953. (740775.)

13531. General Electric Co.—Mounting assemblies for reactor type ballasts. 14th May, 1953. (740572.)

13724. English Electric Valve Co., Ltd.—Resonant cavity structures. 26th March, 1954. (740484.)

17155. Coupland, R. E.—Device for housing a lead for electric irons and other electric appliances. 18th March, 1954. (740644.)

17650. British Thomson-Houston Co., Ltd.—Indicating apparatus embodying electro-luminescent material. 21st June, 1954. (740778.)

17985. Dowty Equipment, Ltd., and Snell, M. S.—Electromagnetically actuated indicators. 29th June, 1954. (740780.)

18598. Submarine Cables, Ltd.—Submarine cables. 17th September, 1954. Cognate application 19695, 15th July, 1953. (740647.)

19473. Taylor, A. B.—Electrical collector systems. 14th July, 1953. (740495.)

19703. English Electric Co., Ltd.—Pipe lagging. 9th July, 1954. (740496.)

20900. Lucas, O. D.—Primary electric batteries. 28th July, 1954. Cognate application 27509, 7th October, 1953. (740497.)

23296. General Electric Co.—Methods of making P-N junction semi-conductor units. 24th August, 1953. (740655.)

24195. Reyrolle & Co., Ltd., A.—Cooling of electric terminal chambers. 27th August, 1954. (740787.)

24697. Metropolitan-Vickers Electrical Co., Ltd.—Cathode-ray tube display apparatus. 29th July, 1954. (740789.)

25047. Reyrolle & Co., Ltd., A.—High voltage electrical switchgear. 30th August, 1954. (740792.)

27414. Atlas-Werke Akt.-Ges.—Production of current pulses through the winding of an electro-acoustic transducer by capacitator discharge. 6th October, 1953. (740512.)

29195. Licentia Patent-Verwaltungs-Ges.—Electric circuit-breaker. 22nd October, 1953. (740594.)

30926. Rosenfeld, M.—Continuous regulating transformers. 9th November, 1953. (740520.)

31881. General Electric Co.—Electric switch mechanism responsive to temperature or other conditions. 17th November, 1953. (740664.)

32834. English Electric Co., Ltd.—Refrigerators. 26th November, 1954. (740795.)

33236. General Electric Co.—Automatic refrigerator controls. 30th November, 1953. (740523.)

33505. Collins Radio Co.—High frequency variable inductors. 2nd December, 1953. (740600.)

34160. General Electric Co.—Gyroscopes. 8th December, 1953. (740796.)

34923. Schmid, W. K.—Electromagnetic control drive mechanisms. 15th December, 1953. (740603.)

35367. Landis & Gyr Akt.-Ges.—Maximum demand meters. 18th December, 1953. (740798.)

36194. Chase-Shawmut Co.—Electric blown fuse indicator. 30th December, 1953. (740670.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 28th October:

UNIC. No. 742,699, Class 8. Electric shaving instruments and parts.—G. Rossé and A. Affolter, trading as Rossé & Affolter, Jura Bernois, Switzerland. Address for service, c/o Marks & Clerk, 57-58, Lincoln's Inn Fields, London, W.C.2.

WIRA. No. 729,637, Class 9. Electrical apparatus and instruments; and scientific, weighing, measuring, checking (supervision) and testing apparatus and instruments.—Wool Industries Research Association, Torridon, Headingley, Leeds, 6.

No. 732,259 (design), Class 9. Sets of electric wiring systems and electric cables, all for motor land vehicles and being parts of the electrical systems of such vehicles.—Auto-Sparks, Ltd., 61a, Lime Street, Hull.

No. 743,388 (design), Class 9. Instruments, apparatus, systems and parts for the production, transmission, reproduction, control, measurement or indication of signals of sound wave frequency, of carrier wave signals modulated at sound wave frequency or of television or other image signals.—Central Rediffusion Services, Ltd., Carlton House, Lower Regent Street, London, S.W.1.

TRANSLITE. No. 742,998, Class 11. Electric lamps, lighting fittings, apparatus and appliances.—Thorn Electrical Industries, Ltd., 105-109, Judd Street, London, W.C.1.

BOOKS RECOMMENDED BY

ELECTRICAL REVIEW

DOMESTIC WATER HEATING:
Basic Engineering Principles of Electric and Solid-Fuel Installations. Ronald Grierson, M.I.E.E., M.I.Mech.E.
25s. net. By post 25s 7d

ELECTRIC-MOTOR CONTROL GEAR
Starting, Protection and Speed. J. L. Watts, A.M.I.E.E. 5s net. By post 5s 3d

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Kenneth B. Mitchell, A.C.W.A., Aff.I.W.M.
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The Publishing Dept., Dorset House, Stamford Street, London, S.E.1.

NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 17th October

BIRMINGHAM.—Grand Hotel, 6.15 p.m. Birmingham Electric Club. "The Proton Synchrotron," by Dr. J. L. Symonds.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Supply Group. Chairman's address, by E. K. Wood.

IPSWICH. — Electric House, 7.15 p.m. Ipswich & District Electrical Association. "Factory Lay-Out and Mechanical Handling," by L. Landon Goodman.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "High-Speed Electronic-Analogue Computing Techniques," by Dr. D. M. MacKay.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Informal meeting. Discussion on "Railway Signalling," opened by J. H. Fraser.

MALVERN.—Winter Gardens, 7.30 p.m. I.E.E. South Worcestershire Group. "Nuclear Power," by Major-General S. W. Joslin.

NEWCASTLE-UPON-TYNE. — King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. Chairman's address, by C. H. W. Lackey.

READING.—George Hotel, King Street, 7.15 p.m. I.E.E. district meeting. "The Electrical Industry—Career Opportunities and Training Schemes," by Dr. A. G. Beverstock.

STAFFORD. — County Technical College. I.E.E. North Staffs. Students' Section. Chairman's address, by D. K. Arkwright.

Tuesday, 18th October

ARBORFIELD.—R.E.M.E. Training Centre, Bailleul Barracks, 7 p.m. I.E.E. London Graduates' & Students' Section, district meeting. Chairman's address, "A.c. Switchgear," by M. H. F. Collins.

BOURNEMOUTH. — Grand Hotel, 8 p.m. A.S.E.E. Southampton Branch. Debate. (Joint meeting with the Bournemouth Branch.)

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. South-East Scotland Sub-Centre. "Thermionic Valves of Improved Quality for Government and Industrial Purposes," by E. G. Rowe, P. Welch and W. W. Wright.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Utilization Group. "Design, Performance and Application of Miniature Circuit-Breakers," by H. W. Wolff and T. G. F. Atherton.

LIVERPOOL.—9, The Temple, 24, Dale Street, 6 p.m. I.E.S. Liverpool Centre. Chairman's address, by G. L. Butler.

LONDON.—At the Institution of Electrical Engineers, W.C.2, 6.30 p.m. Association of Supervising Electrical Engineers. Presidential address, by Bryan Donkin, and presentation of A.S.E.E. Awards.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "The Supply of Electricity in the London Area," by D. B. Irving.

PORTSMOUTH.—"Air Balloon," 598, Commercial Road, Mile End, 7.30 p.m. A.S.E.E. Portsmouth Branch. "Electrical Engineering in Persia," by S. H. Allen.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Students' Section. "Electrical Circuit Theories Applied to Non-Electrical Problems," by G. Kron.

Wednesday, 19th October

BIRMINGHAM.—James Watt Institute, Great Charles Street, 7 p.m. Institution of Production Engineers, Midlands Region, Birmingham Section. "The Application of Electronics to Industry," by J. B. C. Robinson.

GLOUCESTER. — Fleece Hotel, Westgate Street, 6.30 p.m. I.E.S. Gloucester & Cheltenham Centre. "Home Lighting," by Mrs. Jean L. Stewart.

HATFIELD. — Technical College, 7 p.m. I.E.E. district meeting. General discussion Meeting.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio & Telecommunication Section. Chairman's address, by H. Stanesby.

Waterloo Bridge House, S.E.1, 5 p.m. Institution of Post Office Electrical Engineers, London Centre. Discussion on "What Makes an Engineer?" opened by the vice-chairman, J. G. Straw.

A.S.E.E. North London Branch. Visit to Long Distance Exchanges, G.P.O., Faraday Building, Queen Victoria Street, at 7 p.m.

Gaumont-British Theatre, Film House, Wardour Street, 7.15 p.m. British Kinematograph Society. "Magnetic Recording in Film Production," H. V. King and A. W. Lumkin.

MIDDLESBROUGH.—Cleveland Scientific & Technical Institute, Corporation Road, 6.30 p.m. I.E.S. Tees-Side Group. "The Application and Maintenance of Discharge Lamp Installations." by J. J. French.

NORWICH.—Assembly House. Norfolk Electrical Social Committee. Dinner (arranged on behalf of the Norwich Branch of the E.C.A.).

NOTTINGHAM. — E.M.E.B., Showroom Theatre, Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. "A.c. Polyphase Shunt Characteristic Commutator Motors," by A. C. Lane.

PRESTON.—19, Friargate, 7.15 p.m. I.E.S. North Lancashire Group. Members' night.

ROCHESTER.—Bull Hotel, 7 p.m. Incorporated Plant Engineers, Kent Branch. "Selection of Electric Motors for Industrial Purposes," by J. M. Peel.

SHEFFIELD.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. Chairman's address, by W. Rewcastle.

SOUTHAMPTON.—The University, 7 p.m. I.E.E. Southern Centre. "A Transatlantic Telephone Cable," by Dr. M. J. Kelly, Sir Gordon Radley, G. W. Gilman and R. J. Halsey.

SOUTH WIMBLEDON. — I.E.E. London Graduates' & Students' Section. Visit to Foster Transformers, Ltd., at 2.15 p.m.

WOLVERHAMPTON. — Wolverhampton & Staffs. Technical College, 7.15 p.m. Institution of Production Engineers, Midlands Region, Wolverhampton Section. "Plant Maintenance and Productivity," by R. A. Rogers. (Joint meeting with the Graduates' Section.)

Wednesday, 19th October, to Saturday, 29th October

LONDON.—Earls Court. International Motor Exhibition.

Thursday, 20th October

CHELMSFORD.—Crompton's Social Hall, 7.30 p.m. Chelmsford Engineering Society. "The Lighting of Public Thoroughfares," by W. F. S. Debenham.

DUBLIN.—Physical Laboratory, Trinity College, 6 p.m. I.E.E. Irish Branch. Chairman's address, by A. J. Litton.

EXETER.—Royal Clarence Hotel, 3 p.m. I.E.E. South-Western Sub-Centre. Chairman's address, by W. J. Guscott.

HULL.—Y.E.B., Ferensway, 7.15 p.m. I.E.E. North Midland Centre. "Radio Aids to Marine Navigation," by Capt. R. G. Swallow, R.N. (Retd.).

LEICESTER. — Grand Hotel, 7.30 p.m. Institution of Production Engineers, North Midlands Region, Leicester Section. Annual dinner.

LONDON.—Dorchester Hotel, Park Lane, 7 for 7.30 p.m. Institution of Mechanical Engineers. Annual dinner.

Caxton Hall, 2 p.m. Diesel Engine Users' Association. Annual general meeting, followed by "Diesel Engines: Design for Service," by C. H. Bradbury.

SOUTHAMPTON.—Polygon Hotel, 7.15 p.m. Institution of Production Engineers, Southern Region, Southampton Section. "Gas Turbines—Basic Principles and Production Problems," by C. E. Wurr. (Joint meeting with the Institution of Mechanical Engineers and the Royal Aeronautical Society.)

TONBRIDGE.—Rose & Crown Hotel, 8 p.m. A.S.E.E. Kent Branch. "Sunvic Controls," by Miss J. M. Clapperton.

WATFORD.—Clarendon Hotel, Station Road, 8.15 p.m. A.S.E.E. Watford Branch. "Electronics."

Thursday, 20th October, to Saturday, 22nd October

MANCHESTER. — College of Technology, Sackville Street. I.E.S. Manchester Centre. Manchester Federation of Scientific Societies. Conversazione on Light.

Friday, 21st October

BATH.—Electricity House, 7.15 p.m. Electrical Association for Women, Bath Branch. Talk on Home Lighting, by T. O. Freeth.

BIRMINGHAM.—Grand Hotel, 6.30 for 7 p.m. Birmingham Electric Club. Annual dinner.

BLACKBURN.—Assembly Hall. Incorporated Plant Engineers, Blackburn Branch. Annual dinner and dance.

LONDON. — Victoria Halls, Bloomsbury Square, 7.30 p.m. I.E.E. London Graduates' & Students' Section. Autumn dance.

1, Birdcage Walk, S.W.1, 5.30 p.m. Institution of Mechanical Engineers. Presidential address, by P. L. Jones.

Pepys House, 14, Rochester Row, 7 p.m. Junior Institution of Engineers. "The Atom," by S. A. McAuliffe.

Friday, 21st October, to Monday, 24th October

HARROGATE. — Conference of Conference Organizers.

Saturday, 22nd October

OXFORD.—Y.M.C.A., 10, George Street, 6.30 p.m. A.S.E.E. Oxford, Reading & Districts Branch. "Water Heating," by A. Hughes.

OVERSEAS EXHIBITIONS IN NOVEMBER

5th to 14th November

PARIS. — International Dairy Equipment Exhibition.

8th to 10th November

TORONTO.—4th National Packaging Exposition.

8th to 11th November

MONTREAL.—Canada's Power Show.

25th November to 11th December

BOGOTA.—Second International Industrial Fair.

14th to 17th November

CHICAGO. — Second International Automation Exposition.

19th to 30th November

LJUBLJANA (YUGOSLAVIA). — International Radio and Communications Exhibition.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ashton-under-Lyne. — 24th October. Borough Council. Electric wiring of 28 flats on the Taunton estate. A. Fisher, borough surveyor, Municipal Offices.

Australia.—14th December. Queensland State Electricity Commission, Brisbane. Electric batteries and charging equipment for Townsville Regional Electricity Board. (E.S.B. 20800/55. Ten/15897.)*

6th December. Director, Posts and Telegraphs, G.P.O., Melbourne. Telephone dial parts. (E.S.B. 21495/55. Ten/16006.)*

Canada.—24th October. British Columbia Power Commission, Victoria, B.C. Two 40,000 kVA transformers. (E.S.B. 21028/55. Ten/15932.)*

Costa Rica.—22nd October. Junta Administrativa del Servicio Electrico Municipal de Heredia. Electricity meters. (E.S.B. 21569/55. Ten/16032.)*

Dagenham.—5th November. Street lighting equipment. (See this issue.)

Down.—20th October. County Education Committee. Electrical installation at Hillsborough (New) Primary School. J. McCandless, consulting engineer, 6, Murray Street, Belfast.

Easthampstead.—12th December. R.D.C. Street lighting equipment. (See this issue.)

Edinburgh.—North of Scotland Hydro-Electric Board. Lighting, heating and auxiliary cabling at Meig Dam. (See this issue.)

Fife.—28th November. County Council. Street lighting equipment. (See this issue.)

India.—16th January. Electricity Department, Lucknow, Uttar Pradesh. Equipment for Richard Dam power station, including five 70,000 h.p. Francis hydro-electric turbines coupled to 55,500 kVA alternators, together with switchgear, station transformers and ancillary equipment; outdoor switchgear including twelve 132 kV and one 66 kV circuit-breakers; and sixteen 20,000 kVA transformer units to make five banks of 60,000 kVA transformers with one unit as spare, and one 10,000 kVA transformer. (E.S.B. 20714/55. Ten/15895.)*

14th November. Commissioners for the Port of Calcutta. Electrical equipment for conversion of the system at Dock II, Kidderpore Docks, from d.c. to a.c. (E.S.B. 21375/55. Ten/16001.)*

Iraq.—12th November. Central Foreign Purchase Committee, Ministry of Finance. Electrical kitchen apparatus. (E.S.B. 21201/55. Ten/15968.)*

Leeds.—5th December. Waterworks Department. Two electrically-driven vertical borehole pumps, complete with motors and switchgear, for Headingley Filtration Works pumping station. General manager and engineer, Waterworks Department, Civic Hall.

Ludlow.—5th November. Corporation. Sodium discharge street lighting, Newport-Shrewsbury trunk road. (See this issue.)

New Zealand.—9th November. Director-General (Stores Division), G.P.O., Wellington. Four oscilloscopes. (E.S.B. 20842/55. Ten/15881.)* 10th November. Telephone cable. (E.S.B. 20948/55. Ten/15909.)*

31st January. State Hydro-Electric Department, Wellington. 150 MVA, 11 kV switchgear. (E.S.B. 20950/55. Ten/15910.)* 7th February. Four 33,333 kVA outdoor type transformers. (E.S.B. 20988/55. Ten/15911.)*

Pakistan.—26th October. Posts and Telegraphs Directorate, Karachi. 10- and 25-line private automatic exchange equipment. (E.S.B. 20899/55. Ten/15922.)*

3rd November. Director General of Supply and Development, Karachi. Laboratory apparatus and equipment. (E.S.B. 21277/55. Ten/16008.)*

Peterlee.—24th October. Development Corporation. Electrical installations in 136 houses, Dene House site. A. V. Williams, general manager, Shotton Hall, Castle Eden.

Reigate.—31st October. Corporation. Street lighting equipment. (See this issue.)

Sealand.—18th November. Parish Council. Street lighting equipment. (See this issue.)

Skipton.—7th November. U.D.C. Trunk road lighting equipment. (See this issue.)

South Africa.—21st October. Durban Telephone Department. Outdoor cable terminal boxes. (E.S.B. 21305/55. Ten/15981.)* Cable terminal assemblies. (E.S.B. 21304/55. Ten/15982.)* Connecting blocks. (E.S.B. 21306/55. Ten/16003.)* 4th November. Lead sheathed, paper insulated, telephone cable. (E.S.B. 21299/55. Ten/15973.)* Cable, lead sheathed, enamel, silk and cotton insulated. (E.S.B. 21301/55. Ten/15975.)* P.v.c. insulated and sheathed telephone cable. (E.S.B. 21300/55. Ten/15974.)* 18th November. Twin p.v.c. insulated telephone wire. (E.S.B. 21303/55. Ten/15980.)* Flameproof telephone wire. (E.S.B. 21302/55. Ten/15983.)*

26th October. South African Railways, Johannesburg. 400 lead-acid cells. (E.S.B. 21132/55. Ten/15936.)* 2nd November. Electric furnace. (E.S.B. 21348/55. Ten/15995.)*

Southern Rhodesia.—28th October. Controller of Stores and Transport, Causeway. Underground telephone cable. (E.S.B. 21503/55. Ten/16029.)*

11th November. Federal Tender Board, Causeway. 20 kW medium wave transmitter. (E.S.B. 20825/55. Ten/15899.)*

Uruguay.—22nd November. Administracion General de los Usinas Electricas y los Telefonos de Estado. Radio telephonic equipment. (E.S.B. 21244/55. Ten/16007.)*

Windsor.—5th November. Borough Council. Electric lamps (Schedule 15) and electric fittings and cable (Schedule 21) for one year to 31st December, 1956. Borough surveyor, Kipling Building, Alma Road.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bangor.—Two ward blocks, out-patients' and X-ray departments and twin operating theatre at General Hospital for Caernarvonshire and Anglesey Hospital Management Committee (£300,000); Saxon Smith & Partners, architects, 2, Stanley Street, Chester.

Barnes.—Four-storey block of flats, etc., Grasmere Court extension; borough engineer, Municipal Offices, Sheen Lane, London, S.W.14.

Bath.—Domestic science training college (£100,000); J. Owens, city engineer, Guildhall.

Beckenham.—Flats (90), in three-storey blocks; borough surveyor.

Birkenhead.—Science block for Birkenhead School; Morter & Dobie, architects, 11, Rumford Street, Liverpool, 2.

Birmingham.—Garage, canteen and offices at Brookvale Works (£49,400), for Salvage Department; city surveyor, Civic Hall.

Brigg (Lincs).—Further 44 houses on Woodbine estate; U.D.C. architect.

Cardigan.—Extensions to grammar school (£68,000); county architect, County Hall, Aberayron.

Chigwell.—Hostel for aged persons (£50,000), Fencepiece Road; county architect, County Hall, Chelmsford.

Fareham. — Crematorium and chapel (£58,250); borough engineer and surveyor, Town Hall, Gosport.

Hastings.—Scheme for 200 flats, shops, launderette, etc., on site adjoining Woodland Vale Road; Kenneth F. Wray, architect, 43, Gildredge Road, Eastbourne.

Haverhill.—Factory and offices; Polak & Schwartz (England), Ltd., 50, Great Cambridge Road, Enfield.

Jarrow-on-Tyne.—Additions to works for C. Lennig and Co. (Great Britain), Ltd., Jarrow.

Kirkham.—Kirkham County Secondary School; Atherton Bros., Ltd., 70, Peter Street, Blackpool.

Leicester.—Hotel, Kerrial Road, New Parks estate; Smith & Williams, architects, 13, De Montfort Street.

Liverpool.—Shop and office building at Lord Street for W. Barratt & Co., Ltd.; Taylor Woodrow Construction Co., Ltd., Southall, Middlesex.

London.—Large extensions to Home for Aged Jews, 105, Nightingale Lane, S.W.12; Young & Hall, architects, 9, Southampton Row, W.C.1.

Headquarters building at Mansfield Street, Portland Place, for Royal College of Midwives, 57, Lower Belgrave Street, S.W.1.

Block of offices, Leather Lane; Prudential Assurance Co., Ltd., Holborn Bars, E.C.1.

Additions to Morley College, Westminster Bridge Road; Brandon-Jones, Ashton & Broadbent, architects, 2, Redington Road, N.W.3.

Maidstone.—Showrooms and offices; Miles (Maidstone), Ltd., King Street.

Manchester.—Central highways depot, King Street, Ardwick; L. C. Howitt, city architect, Town Hall.

Showrooms and offices, 22/28, Wilmslow Road, Rusholme; Senior Motors, Ltd., 131, London Road, Ardwick.

Middlesbrough.—Community centres at Whinney Banks and Thorntree and children's home at Whinney Banks; J. A. Kenyon, borough engineer.

Morpeth.—Secondary modern school for Northumberland E.C.; county architect, County Hall, Newcastle-on-Tyne.

Newcastle-on-Tyne.—School building programme for 1956-7:—Rutherford Girls' High School, Kenton County Primary, Kenton R.C. Mixed Secondary, Kenton Girls' Secondary, Kenton Boys' Secondary and Montagu Primary; G. Kenyon, city architect.

Methodist churches at Whitley Bay, North Shields, Blyth, Wardley and Monkseaton; Newcastle District of the Methodist Church.

Northampton.—Rebuilding of Church House, College Street; Basil Spence, architect, 40, Moray Place, Edinburgh.

Northants.—Modern schools, Deanshanger and Guilsborough and primary school at Weston Favell; county architect, County Offices, Guildhall Road, Northampton.

North Shields.—Four blocks of five-storey flats, Stephenson Street; borough surveyor.

Stockton-on-Tees.—Houses (42), Albany estate; borough architect, 28, The Square.

Wellingborough. — Secondary technical school; Foster & Dicksee, Ltd., Rugby.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).